NOAA Technical Memorandum NOS ORCA 95

International Mussel Watch

Coastal Chemical Contaminant
Monitoring Using Bivalves

International Mussel Watch Project

Initial Implementation Phase
Final Report

May, 1995
International Mussel Watch Committee

Prepared by IMW Project Secretariat:

Woods Hole Oceanographic Institution
Coastal Research Center
(J.W. Farrington and B.W. Tripp, Editors)

with assistance from Analytical Centers:

International Atomic Energy Agency,
Marine Environment Laboratory (MEL)
and
Texas A&M University,
Geochemical and Environmental Research Group (GERG)

Supported by

UNESCO Intergovernmental Oceanographic Commission
The United Nations Environment Programme
US National Oceanic and Atmospheric Administration

US Department of Commerce
noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
Office of Ocean Resources Conservation and Assessment
National Ocean Service
Silver Spring, Maryland

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United States Department of Commerce	National Oceanic and Atmospheric Administration	National Ocean Service
Ronald H. Brown Secretary	D. James Baker Under Secretary	W. Stanley Wilson Assistant Administrator

International Mussel Watch Project

Final Report
Initial Implementation Phase

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Dedication

Professor Edward D. Goldberg
Chair, International Mussel Watch Committee

Professor Edward D. Goldberg, distinguished marine geochemist and Tyler Prize Laureate, and now retired from the Scripps Institution of Oceanography, University of California- San Diego, serves as Chairman of the International Mussel Watch Committee. His long standing dedication to obtaining high-quality objective data for assessing the extent and severity of chemical contamination in the world's oceans, especially the coastal zone, and communicating these data in a manner understood by all sectors of global societies has been a major contributing factor to planning and executing the International Mussel Watch Program. Professor Goldberg provides inspiration and advice to all those participating in the effort.

John W. Farrington
Bruce W. Tripp
Woods Hole, Massachusetts
October 31, 1994

Acknowledgments

The International Mussel Watch Project has been freely supported by the good-will and dedicated effort of many people over a long period of time from concept through planning to implementation and completion of the Initial Phase in South and Central America and the Caribbean. Were we to adaquately acknowledge individual contributions by each person, this section would be equal to, or greater in length than, the main report. It is our belief that for the people dedicated to the success of this program, the results described here and the use of these results by global societies within the United Nations family is the desired acknowledgment. Nevertheless, several people deserve special recognition and these are given in the following paragraphs.

The Project was concieved by scientists from many countries, several of whom came together as the International Mussel Watch Committee to oversee the implementation and progress of the concept. Intergovernmental mechanisms provided by UNESCO-IOC and UNEP assured that national agencies in each country were contacted and their endorsement solicited. The role of these intergovernmental bodies in providing official sanction for the Program is acknowledged. In addition, the GIPME program functions as a scientific umbrella that can provide links to other national and international programs to disseminate the results of International Mussel Watch. The US NOAA, in addition to the direct support mentioned below, cooperated at the agency level with UNESCO-IOC and UNEP to ensure the success of the Project.

The Initial Implementation Phase of the International Mussel Watch Program was a complex logistical undertaking. **Dr. José Sericano** of the Geochemical and Environmental Research Group (GERG) of Texas A & M University in the United States was temporarily seconded to the Marine Environmental Laboratory (MEL) of IAEA to serve as the Field Scientific Officer for this Initial Phase of the IMW Project. Dr. Sericano personally collected the vast majority of the samples and supervised the few other collections in the program. The remarkable scope of this undertaking is underscored when viewing the sampling location chart in the body of this report. Dr. Sericano was also the principal analyst in the analytical chemistry effort by GERG.

The field sampling effort by Dr. Sericano and other key aspects of the program was successful because of the support of the Host-Country scientists on whom he relied. Without their cooperation and support in each country, this project could not have been completed. A base of operations for the field program was generously offered at the University of Costa Rica by **Dr. Manuel Murillo,** Director of the Centro de Investigacion en Ciencas del Mar y Limnologia (CIMAR). Local support of the Field Scientist at CIMAR was reliably and consistently given by **Dr. Jenaro Acuna.**

Analysis of the field-collected samples is an essential component of IMW and the analytical chemistry efforts of the scientists at the Geochemical and Environmental Research Group (GERG) led by **Drs. Terry Wade** and **José Sericano** and at the IAEA Marine Environment Laboratory (MEL) led by **Dr. James Readman** have provided us with a unique high-quality database. In addition to Dr. Readman at MEL, **Dr. Jean-Pierre Villeneuve** and **Chantal Cattini** provided analytical assistance.

The philosophical and intellectual leadership provided by **Prof. Edward D. Goldberg** was fully supported by the **International Mussel Watch Committee** and their dedicated efforts to the International Mussel Watch Project over many years must be acknowledged. Some members of the International Mussel Watch Committee deserve individual recognition. **Dr. Eric Schneider** first supported Professor Goldberg's idea of a Mussel Watch program in 1975 with the funding to support the original U.S. Environmental Protection Agency National Mussel Watch Program. As a member of the International Mussel Watch Committee, Dr. Schneider expended considerable efforts in arranging financial support at key stages of the early planning process and provided enthusiastic intellectual support in getting the IMW effort beyond the planning stages. In collaboration with **Dr. Rodger Dawson** of the Center for Estuarine and Environmental Studies, University of Maryland, Dr. Schneider organized key workshops in the early years. Dr. Dawson's expertise as a chemical oceanographer and environmental chemist, his experience with international scientific research and training exercises within the United Nations programs and his seemingly inexhaustible energy proved invaluable throughout the program. **Dr. Arne Jernelov** provided his considerable global experience in an advisory capacity to the International Mussel Watch Committee deliberations. **Dr. Lawrence Mee**, formerly the Head of the Marine Environmental Studies Laboratory at IAEA and now based in Turkey as the Coordinator of the Global Environmental Facility Black Sea Environmental Programme provided enthusiastic and pragmatic guidance in support of this effort and was especially valuable in interfacing the IMW Program with other United Nations efforts ongoing in the South and Central American and Caribbean Regions.

Drs. Thomas P. O'Connor and **Adrianna Cantillo** of the National Status and Trends Program Office, of the U.S. National Oceanic and Atmospheric Administration, U.S. Department of Commerce provided valuable support and advice throughout the duration of the Initial Phase. They arranged for the incorporation of the IMW program in Quality Assurance activities of NOAA S&T and for distribution of valuable NOAA manuals and reports to Host-Country scientists. Dr. O' Connor also identified and helped to secure essential support for workshops and meetings throughout the initial implementation phase.

Financial Support was provided by : US NOAA, for direct grants to UNESCO-IOC, funding for analyses by GERG and funds for meeting travel and technical assistance through the Coastal Monitoring Branch of ORCA; UNESCO-IOC, for funding support of MEL for analyses and the field collections and support of the Costa Rica meeting; UNEP, for funding to UNESCO-IOC; SAREC, for support of the Caribbean scientist training workshop; WHOI, for cost-sharing throughout the project.

Executive Summary
International Mussel Watch, Initial Phase

The International Mussel Watch Program Initial Phase (South America, Central America, Caribbean and Mexico) has been completed. International Mussel Watch was undertaken under the auspices of the UNESCO Intergovernmental Oceanographic Commission, and the UNEP Ocean and Coastal Areas Program to assess the extent of chemical contamination of the coastal areas; primarily in the equatorial and subequatorial areas of the southern hemisphere with particular attention to coastal areas of developing countries. Previous national and international regional efforts had provided a first assessment and several in depth studies for coastal areas of developed countries in the northern hemisphere using bivalves as sentinel organisms of chemical contamination of the coastal areas.

This Final Report meets three goals:

- reports the analytical results of IMW Initial Phase, with interpretation of the combined data set,
- documents the organization and implementation of the Initial Phase, and
- serves as a reference for participating scientists in the region.

In May, 1991 members of the International Mussel Watch Committee and representatives of three regional monitoring programs met at the University of Costa Rica under the leadership of Prof. Edward D. Goldberg, Chairman of the International Mussel Watch Committee to finalize the initial implementation phase (Phase I). Sampling sites were chosen and participating national scientists identified. The Project Secretariat at Woods Hole Oceanographic Institution under the direction of Dr. John W. Farrington , Vice Chairman of the International Mussel Watch Committee, and Mr. Bruce W. Tripp, Executive Officer of International Mussel Watch coordinated this Initial Phase. The two central analytical facilities where the samples were analyzed were the Marine Environmental Laboratory (MEL), International Atomic Agency Laboratory, Monaco and the Geochemical and Environmental Research Group (GERG) at Texas A and M University, College Station, Texas, USA.

Dr. José Sericano of GERG was seconded to MEL for purposes of the field sampling and he collected samples throughout the region with assistance from Host-Country scientists. A total of 76 sites were sampled. Selection of sites included locations near known or suspected contamination sources (industrial, urban, agricultural run-off) and suspected non-contaminated sites and were from estuarine and open coast parts of the sub-littoral. Since there are not one, two or even three species which are common to allsites when considering the entire coastal region of this IMW phase, between two and five different species were collected at several of the stations for between-species comparison to calibrate the sample set. Between-species differences of no more than a factor of four were found for these sample collections and is similar to between-species differences reported elsewhere.

Frozen archive samples are being maintained temporarily at GERG for future use of the UNESCO-IOC and UNEP programs. Shell samples representative of the entire sample set were sent to Dr. Ruth Turner at the Museum of Comparative Zoology , Harvard University, Cambridge, Massachusetts, USA for identification of several unknown bivalve species which could not be identified by local scientists. The collection of shells is now stored at Harvard University as a reference set for species identification.

The initial focus of the International Mussel Watch Program was on chlorinated pesticides and individual chlorobiphenyls of the polychlorinated biphenyls (PCBs). The initial set of target analyte chlorinated pesticides were: aldrin, endrin, dieldrin, chlordanes, DDT family, heptachlor, heptachlor expoxide, hexachlorbenezene (HCB), alpha-hexachlorocyclohexane (alpha-HCH), beta- hexachlorocyclohexane (beta-HCH), Lindane (gamma-HCH), trans-nonachlor, and methoxychlor. A Quality Control and Quality Assurance(QA/QC) program was coordinated by the Secretariat at WHOI and provided a framework for evaluation of the field data submitted by each of the central analytical facilities. Timing of funding to the central analytical facilities forced the initial QA/QC exercise to coincide with the analysis of the field samples, with the attendant risk of finding major differences in data between laboratories after the first set of field samples were analyzed. However, the QA/QC results were generally satisfactory to excellent and comparable to similar between-laboratory comparisons of experienced laboratories for these analytes.

Participating Host-Country laboratories also received a set of QA/QC samples and standard solutions of the analytes and also several of these laboratories analyzed comparable portions of field samples. Results of the QA/QC exercise for the national laboratories were for their own individual use and are not reported in detail.

A total of 76 sites were sampled during this Initial Phase. Analyses show that concentrations of chlorinated pesticides were not elevated for most of the stations and were similar to the range of concentrations found in the United States, based on the National Oceanic and Atmospheric Administration's National Status and Trends (NOAA-NS&T) data set during the late 1980s to early 1990s.

Several stations in this region show elevated concentrations of one or more chlorinated pesticides compared to the rest of the data. Most of these stations were near urban or agricultural areas. Individual chlorobiphenyl concentrations were generally lower for the in Latin America data set in comparison to the NOAA-NS&T dataset for the U.S. coast, perhaps indicating less use and/or release of PCBs in this region in comparison to the United States.

GERG also undertook analyses of selected polycyclic aromatic hydrocarbons (PAH) under the auspices of the IMW project and with the approval of the participants at a preliminary data assessment meeting in São Paulo, Brazil in April, 1993. PAH concentrations in the sample set are within the range of PAH concentrations found in the NOAA NS&T data set, and several locations had elevated concentrations. Both petroleum and fossil fuel combustion product PAHs were identified in samples with elevated concentrations. These results indicate the need for assessing further the extent and severity of PAH concentrations in coastal areas of this region and an assessment of adverse effects in areas where PAH have elevated concentrations.

International Mussel Watch Program Initial Phase has accomplished the following:

- Provided a systematic regional assessment of the concentrations of several chlorinated pesticides, chlorobiphenyls and PAH in bivalve sentinel organisms in coastal areas of the region and contributed to the global data base for the distribution of these chemicals in the environment.
- Established a regional network of Host-Country scientists that can contribute to a continued assessment of the extent and severity of contamination by several chemicals of environmental concern in coastal areas by use of the bivalve sentinel organism approach.
- Provided technical support to this network of scientists and stimulated this regional network to undertake further cooperative studies within the region on problems of mutual interest.
- Established an archive of frozen samples from stations in this global region.
- Established a reference set of mollusk shells archived at the Museum of Comparative Zoology of Harvard University in Cambridge, Massachusetts.
- Proved that the International Mussel Watch concept is viable and should be undertaken in other regions of the world's coasts.

Lessons learned or reinforced from the Initial Phase of International Mussel Watch:

- Field collection of high-quality samples is logistically complex and requires a skilled, scientifically competent Field Scientist who is authorized to make decisions in the field. The Field Scientist must personally collect each sample or personally supervise the collection and requires a budget for local sampling expenses as well as a budget which includes travel, shipping, insurance, communication etc.
- Participation by Host-Country scientists is crucial to the success of the Project. Local knowledge and local logistic support is essential and the Field Scientist cannot successfully accomplished his/her sampling task without it. Good communication with these local scientists prior to the Field Scientist visit is necessary so they can adapt their own schedules.
- Sampling by the Field Scientist should be accomplished in short trips from a central base to minimize the risk of lost samples. The central base must have adequate reliable freezer space, reliable international communication capability and dependable international airline connections. Regular communication between the Field Scientist and the Project Secretariat is essential.
- Geographic station location data should be simultaneously acquired with the tissue sample to document station location. A hand-held GPS should be carried by the Field Scientist. Station selection by the Host-Country scientist can be improved if the Project develops a standard "site selection process" for each local scientist to follow. This process must include a recent site visit by the local scientist prior to the arrival of the IMW Field Scientist.

- Shipping of field-collected samples is risky and, ideally, will be done by courier. Both sets of duplicate samples should not be shipped together. Sample shipments should be accompanied by a "letter of authority" from a local scientist and from the Project; perhaps a UN Property Pass would also be useful in some places.
- Production and use data for chlorinated biocides in the region is sparse. Record-keeping has been poor and access to records is difficult. Several national summary reports are available for parts of this global region and these may define the extent of useful data.
- An interlaboratory comparison exercise should be run between the Central Labs prior to the initiation of any analyses of field samples. This exercise should include a meeting of principal analysts to resolve any analytical differences (or reporting differences) that arise.
- There should be continuity with the analytical effort of the Initial Phase as IMW expands to new global regions. Priority must continue to be given to the need for high-quality data.
- "Capacity Building" should be an integral component in the Project and Host Country scientists should be supported with training manuals, workshops, technical reports and QA Reference Standards. This component of the Project should also assist with the creation of new coastal monitoring programs and with the integration of IMW data and scientific network of scientists into existing international efforts.
- International Mussel Watch should remain flexible and respond to coastal monitoring needs as identified by each global region. Monitoring of additional chemical contaminants (e.g. selected metals, PAHs, nitrogen, and biological agents (e.g. virus, red tide) should be considered as IMW moves to new regions.
- There is a continuing need for IMW project oversight to maintain the database, integrate the seperate efforts and provide continuity for the several phases and to interface the global region scientific networks which develop.
- The Project should foster increased scientific communication in the region in order to give support to local scientists in the IMW network. Specific research projects and student theses should grow from the IMW effort.
- Processes and procedures for better integration of the IMW data into regional national decision-making needs to be addressed.

The successful completion of this Initial Phase provides a base of information and a scientific network for future international activities. The Initial Phase of International Mussel Watch has successfully produced a unique high-quality database of chemical contaminants in coastal organisms from a widespread geographic region. These data are useful to guide future research and monitoring activities in the region. These data and their interpretation will also provide a sound basis for formulation and implementation of policies for protection of human health and for wise management of coastal ecosystems.

We expect that this program will benefit from, and collaborate with, existing national and regional efforts. This program should provide an impetus for additional national and regional research and monitoring activities concerning pollution of coastal areas. An added benefit will be dissemination to the world community of the results of a successful collaborative experience involving sampling, sample storage, chemical analysis, quality assurance procedures and data interpretation.

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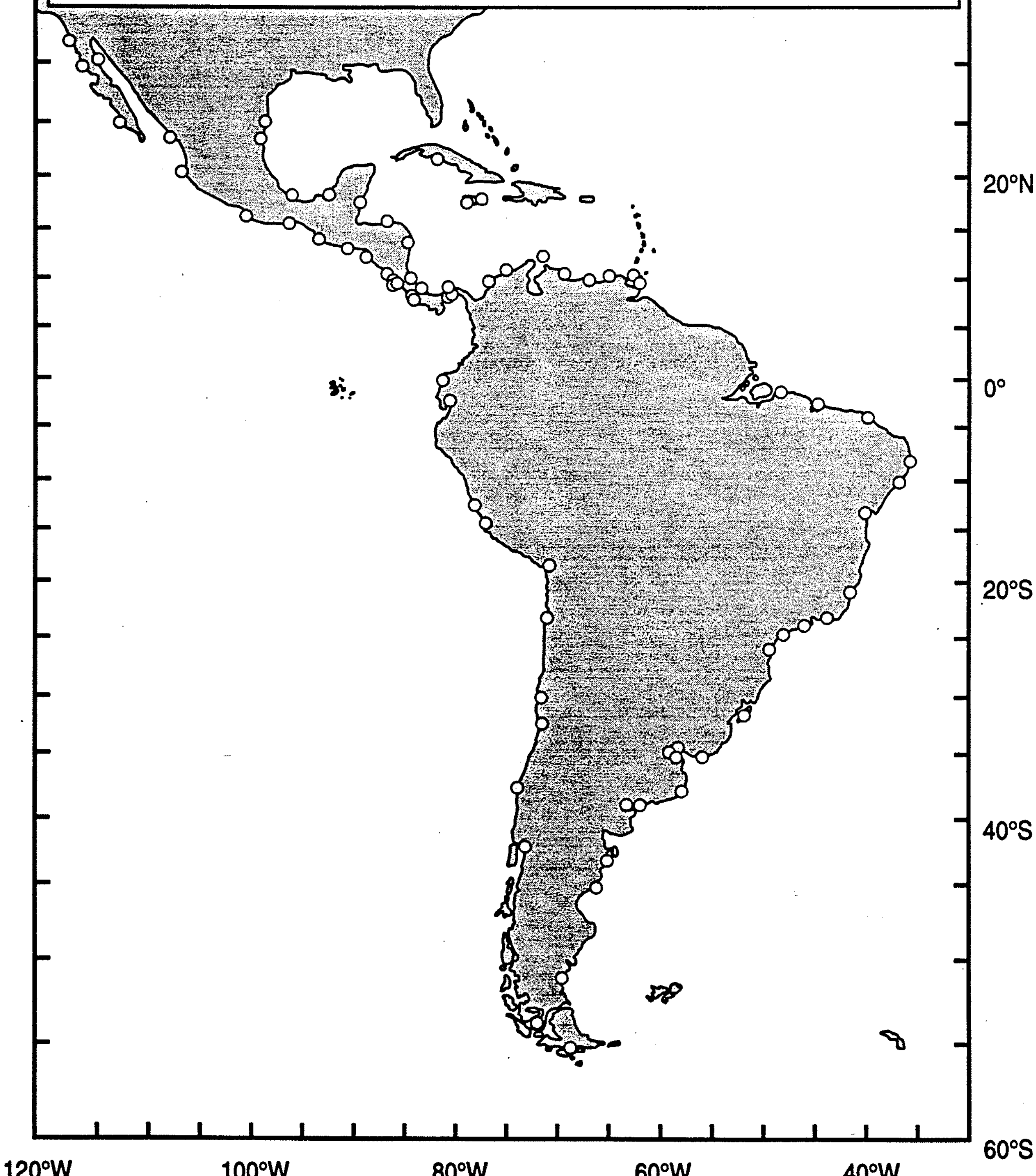
International Mussel Watch

Coastal Chemical Contaminant
Monitoring Using Bivalves

Initial Implementation Phase



International Mussel Watch: introduction and overview

The International Oceanographic Commission (IOC), in collaboration with the United Nations Environment Program (UNEP) and the U.S. National Oceanographic and Atmospheric Administration (NOAA) have supported the creation of the International Mussel Watch Project and completed an initial monitoring program in the Latin America region, including central-South America and the wider Caribbean area including Mexico, in 1991-92 (Figure 1). The program has been directed by the International Mussel Watch Committee and coordinated and administered by the Project Secretariat office based at the Coastal Research Center of the Woods Hole Oceanographic Institution.

The genesis of the International Mussel Watch Project can easily be traced to the 1975 *Marine Pollution Bulletin* editorial where Professor Edward Goldberg of Scripps Institution of Oceanography called for a global marine monitoring program to serve as a "spring board for action" (Goldberg, 1975). In his editorial, Prof. Goldberg outlined a global scale monitoring program based on the sentinel organism concept that is capable of detecting trends in concentrations of several important marine contaminants. Since the mid-1970's, scientists of several countries have used bivalve filter-feeding mollusks to monitor for selected chemical contaminants in coastal marine waters. Such contamination of coastal waters might result in chemical changes that are deleterious, over the long term, to both the integrity of the coastal environment and to human health. Because of their sedentary habits and their ability to bioconcentrate the pollutants of interest, mussels and other bivalve species appear to be appropriate sentinel organisms (Table 1 and Phillips, 1980). This approach to marine monitoring has been successfully applied in several national and regional programs in Europe, Taiwan, Canada and the United States and an extensive scientific literature has been generated from this work (NOAA, 1991). The mussel watch approach has been adopted as one of several coastal environmental quality monitoring strategies by United Nations programs and the International Mussel Watch Project is working to build on this cumulative experience.

Particularly important among the monitoring programs that were established during the 1970's were those of the Organization of Economic Cooperation and Development and of International Council for the Exploration of the Sea. The United Nations Environment Program has also created its Regional Seas Program which has placed a major emphasis on the development of host country capabilities for measuring the levels of pollutants in coastal and marine environments. The Intergovernmental Oceanographic Commission of the UNESCO sponsored the formation of a Task Team on Marine Pollution Research and Monitoring in the West Pacific region. National governments of many countries have initiated their own programs to provide for longer-term protection of coastal zones from the deleterious effects of chemical

TABLE 1: Attributes of Bivalves as Sentinel Organisms

- A correlation exists between the pollutant content of the organism and the average pollutant concentration in the surrounding habitat; contaminant concentration factors of many-fold (over seawater concentrations) are common .

- Bivalves are cosmopolitan, minimizing the inherent problems which arise when comparing data from markedly different species; this issue will be more importent in tropical areas.

- Bivalves have reasonably high tolerance to many types of pollution and can exsist in habitats contaminated within much of the known range of pollution.

- Bivalves are sedentary generally and better representative of the study area than mobile species.

- Bivalves often are abundant in relatively stable populations that can be sampled repeatedly throughout the study region.

- Many bivalve species are sufficiently long-lived to allow the sampling of more than one year-class, if desired.

- Bivalves are often of a reasonable size, providing adequate tissue for analysis.

- Bivalves are easy to sample and hardy enough to survive in the laboratory, allowing defecation before analysis (if desired) and laboratory studies of pollutant uptake.

- Several bivalve species tolerate a range of salinity and other environmental conditions, making them hardy enough to be transplanted to other areas for experimentation.

- Bivalves are generally metabolically passive to the contaminants in question and not alter the chemical after uptake; uptake by the organism provides an assessment of bioavailability from environmental compartments.

- Bivalves are commercially valuable seafood and a measure of chemical contamination is of public health interest.

contamination. In the United States, the "Mussel Watch" program was begun by the U.S. EPA in the mid-1970's and involved academic scientists from Scripps Institution of Oceanography, Moss Landing Marine Laboratory, University of California Bodega Bay Laboratory, University of Texas Marine Sciences Institute and Woods Hole Oceanographic Institution. This program used mussels and oysters as indicators of the concentrations of several classes of pollutants, principally synthetic organics, fossil fuel compounds and their derivatives, several trace elements, and the transuranic radioactive elements produced in the nuclear fuel cycle and by fallout from nuclear weapons tests (Farrington et al, 1983). Mussel Watch became an operational contaminant monitoring program in the United States in 1986 and is directed by NOAA as a part of the Status and Trends Program (NOAA, 1987, 1989, O'Connor, 1991).

In December, 1978, the members of the U.S. Mussel Watch Program joined with scientists of other countries to hold an international workshop in Barcelona, Spain. This workshop assessed the methodologies employed for the detection and measurement of pollutants in coastal zones through the use of indicator organisms (NRC, 1980). The participants at the Barcelona workshop decided that continuing international collaboration and communication would be worthwhile, and elected a committee charged with the task of planning for the initiation of a global monitoring program. Communication at the international level was continued at a second meeting held in Honolulu, Hawaii in November of 1983 under the chairmanship of Dr. Robert Risebrough, Bodega Bay Institute. Participants at the Hawaii meeting examined the conceptual approaches used by the Mussel Watch programs and assessed the potential for expansion of this approach to a global scale (Peterson and Tripp, 1984; Sivalingam, 1984). The International Mussel Watch Project had its genesis at the Hawaii meeting. Planning momentum was maintained by the International Mussel Watch Committee under the leadership of Prof. Edward Goldberg who received substantial support from a planning office based at the University of Maryland and directed by Drs. Rodger Dawson and Eric Schneider. The Initial Phase of the Project has been implemented in the Latin American region (Figure 1) and due to financial limitations, has focused mainly on organochlorine contaminants. Financial support for the Project is coordinated by the Intergovernmental Oceanographic Commission and includes financial contributions from IOC-UNESCO, UNEP, US-NOAA, with cost-sharing from the Woods Hole Oceanographic Institution and in-kind contributions from the University of Texas and host country institutions.

A primary initial goal of the International Mussel Watch is to ascertain and to assess the levels of chlorinated hydrocarbon pesticides and polychlorinated biphenyls in bivalves collected from coastal marine waters throughout the world, with emphasis on tropical and southern hemispheric locations where the use of these biocides continues. Prior to the IMW sampling in 1991-2, there has been no systematic survey of organic contaminants in the tropical and subtropical coastal regions of the southern Hemisphere. Increased use, or continued use at present rates, of these persistent toxic biocides may result in contamination of living coastal resources with consequent implications for human health and the integrity of marine communities (Goldberg, 1976; Goldberg, 1991; UNEP, 1990; World Resources Inst., 1994).

Comparison of the measured values with those from temperate and subtropical zones of the northern hemisphere of the 1960's and the 1970's (at which times morbidities and mortalities related to chlorinated hydrocarbons pollution were observed) will provide an assessment as to whether populations at upper trophic levels, the most susceptible parts of the ecosystem (e.g., mammals and birds), are at risk from these compounds.

Another goal for the International Mussel Watch Project is capacity building and this program will help develop a sustainable research and monitoring activity for observation and monitoring chemical contamination in the coastal regions of the world's oceans. Such a global network will provide a framework for new national efforts and will produce comparable and reliable monitoring data for environmental decision makers.

The International Mussel Watch Project complements regional and national monitoring programs where they are established, thus linking the existing programs and increasing their effectiveness. Existing regional programs provide a base on which to build an international program and their support and collaboration is critical to the success of the international program. The organizational structure of the Initial Phase is represented in Figure 2.

International Mussel Watch Objectives

* To establish on a global scale the levels of contamination of selected organochlorine pesticides and the polychlorinated biphenyls, in the coastal marine environment.

* To compare, where possible, present day levels of organochlorine compounds found in the tropics and the southern hemispheric locations with those found in the northern hemisphere during the 1960's and 1970's, where ecosystems disturbances at the upper trophic levels (fish, birds, cetaceans) were apparent.

* To establish an archive of samples to provide a basis for a time series comparison for both these compounds and as yet unidentified industrial and agricultural contaminants.

* To contribute to the global data base for the evaluation of the present and future state of the health of the oceans. Provide laboratories and regional organizations with baseline data against which to interpret trends in the global environment and to make future environmental management decisions.

Results and Progress of the Initial Implementation Phase

* Generation of a unique, high-quality data base on the distribution of organochlorine concentration residues (and polycyclic aromatic hydrocarbons in selected samples) in sentinel bivalves on a global region scale.

INTERNATIONAL MUSSEL WATCH

Initial Implementation Phase Caribbean, Central America and South America

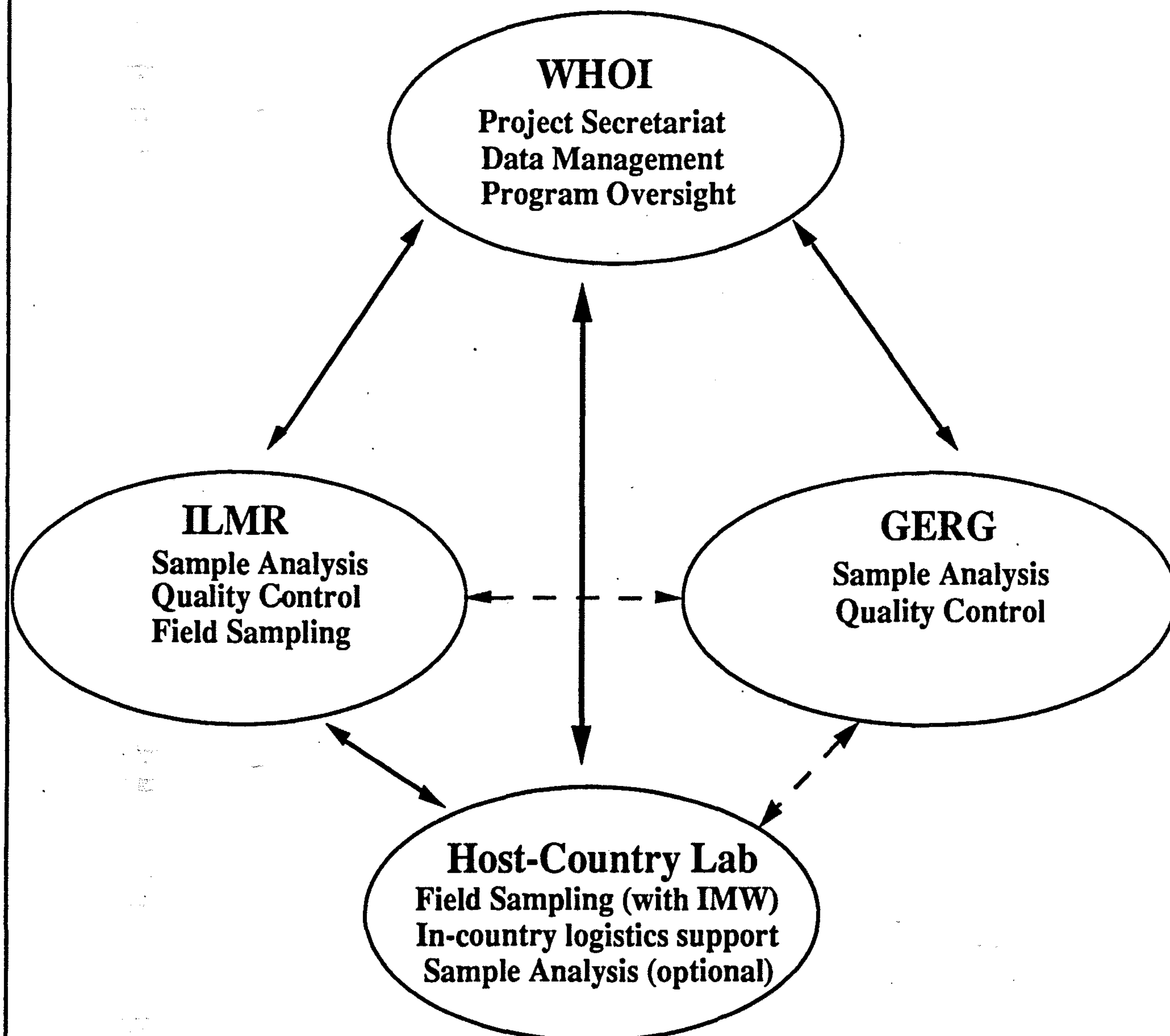


FIGURE 2: Organizational Structure

* Stimulation of an approach whereby regional specialized networks of laboratories employ the sentinel organism technique for surveillance and monitoring of contamination; serve as a "field-test" of a large-scale international coastal monitoring program for chemical contaminants.

* Creation of a global area regional network for data exchange between area laboratories, including discussion of quality control, sample analysis, data format and data analysis procedures.

* Encourage the creation of an institutional mechanism capable of building on the base of this Initial Phase to systematically produce high quality data on priority contaminants in the near-shore environment using tested methods of sampling and analysis for baseline studies, for regional monitoring programs and for research studies.

* Provide technical assistance to scientists in the IMW Phase I (Latin America) region concerning sampling and analysis of environmental samples, data interpretation and access to international scientific literature.

* Assist regional scientists with the evaluation of scientific data for use by decision-makers in all government levels.

* Increase national capabilities to assess environmental problems related to organochlorine pesticides, industrial chemicals and other contaminants in the broader context of a global baseline; provide a forum for training and for a discussion of the interpretation of analytical results in the context of environmental processes.

* Create a base for assessment of priorities for future research and monitoring in relation to the information gathered during this IMW phase with existing historic information.

Initial Implementation Phase; Operational Activities

In May, 1991 members of the International Mussel Watch Committee and representatives of three regional monitoring programs (i.e. Costa Atlantica Sudoccidental,CASO; Comision Permanente del Pacifico Sur, CPPS; Regional Programme for Assessment and Control of Marine Pollution in the Wider Caribbean,CEPPOL) met at the University of Costa Rica to organize the Initial Implementation Phase of International Mussel Watch. In this Initial Phase, the goal was to collect samples from throughout the region by the IMW Field Scientist, with the assistance of Host-Country scientists (IMW, 1992). The Initial Phase region includes both coasts of Central and South America, including the wider Caribbean area and Mexico. Discussions in Costa Rica resulted in a fine-tuning of the International Mussel Watch program design, a solidification of the sampling program and the list of national participants (see Appendix F). Potential sampling areas were selected and Host-Country scientists invited to collaborate in the program. The Initial Implementation Phase provides direct experience for introducing this program to other global regions. Host-Country scientists form the nucleus of an international marine monitoring network through which the results of the project are being disseminated.

Field sampling, Host-Country scientist analyses and data interpretation has been coordinated by the Woods Hole Oceanographic Institution-based Project Secretariat, under the guidance of the IMW Executive Officer. Sampling during the Initial Implementation Phase took place at 76 sites in the IMW Initial Phase region (see map, Figure 2). Sampling locations include sites presumed to be contaminated (industrial, urban or agriculture run-off) and non-contaminated (rural, undeveloped), and encompasses both estuarine and open-ocean coastline. One sampling "station" covers an approximate linear distance of 200 meters and replicate samples of the same species were usually collected at each "station". Large or highly variable (e.g., different sediment substrates) sites may contain more than one "station".

The identification of sites using these criteria was made by local scientists familiar with the area in concert with the International Mussel Watch Field Scientist. All sampling and sample logistics have been carried out under the direct supervision of the IMW Field Scientific Officer, who was under contract to the IAEA Marine Environmental Laboratory. The Host-Country scientists have directly assisted the Field Scientist with travel logistics and sampling and without their participation this program could not have been implemented. A report of the field sampling is found in Appendix E.

Shells of collected samples were retained by the Field Scientific Officer at each site. In some cases, species identification was questioned in the field and collected shells were provided to Dr. Ruth Turner and Mr. Zachary Zevitas of the Museum of Comparative Zoology(MCZ) at Harvard University, Cambridge, Masasachusetts. They generously agreed to assist with species identification at no cost to the project. All IMW shell samples collected in Latin America have been donated to the MCZ to supplement their existing mollusk collection.

Collected samples were distributed for chemical analysis by two contract laboratories. Selection of these analytical facilities for analyses of field-collected samples from the regions was based on the following criteria:

(i) prior experience in chemical analyses for organochlorine compounds using capillary gas chromatography with confirmatory gas chromatographic mass spectrometric (GC-MS) techniques.
(ii) proven capability to produce high quality data for organochlorine analyses in marine tissue samples; including glass or fused silica capillary GC and access to capillary GC-MS back up.
(iii) commitment of supervisory scientists in the laboratory for the direction of analysts in the project, quality assurance checks, and assessment of data.
(iv) reputation and acceptability to international-regional groups of scientists, their governments and international bodies.
(v) ability to carry out the program within the designated time period.

The two Analytical Centers selected for the Initial Phase were the International Atomic Energy Agency Marine Environment Laboratory (MEL), Principality of Monaco, and the Geochemical and Environmental Research Group (GERG), Texas A&M University, College Station, Texas, U.S.A.

Data interpretation of the combined IMW dataset (found in Appendix A) has been undertaken by the Project Secretariat with substantial input from the Analytical Center analysts and several Host-Country scientists. All data are being made available to participating Host-Country scientists by a copy of this report.

Host-Country scientists with requisite analytical expertise, and who wished to do so, retained tissue samples collected by the Field Scientist for in-country analysis. Results of field sample analysis by the individual national laboratories have been retained for individual comparison with data from the IMW Analytical Centers. An interlaboratory comparison exercise was conducted by the Project Secretariat and the results of this work is summarized in Appendix C. Host-country scientists were asked to determine production and use data from available sources in their respective countries and this information is summarized in Appendix D.

Quality Assurance and Quality Control

Trace analyses of organic contaminants in this program can be difficult because of the low concentrations of many of the target analytes and the several different bivalve species or different physiologic states of the same species collected over a wide geographic range. The original plan for the Initial Implementation Phase included a Quality Control and Quality Assurance (QA/QC) interlaboratory comparison prior to the phase of field sample analyses. The plan had to be revised to accommodate funding and scheduling constraints. However, a good series of QA/QC analyses have been completed. An extensive scientific literature on good Quality Control/Quality Assurance practices can be found elsewhere, but several are cited here (Farrington et al 1983; Taylor, 1985, 1985a; UNEP, 1990; UNESCO, 1990; Villeneuve and Mee, 1989, 1990)

There were two principle components to the QA/QC program in the Initial Implementation Phase. The first component was the routine QA/QC internal to each Analytical Center (IAEA Marine Environmental Laboratory [MEL], and Texas A & M University Geochemical and Environmental Research Group [GERG]). The second component was coordinated by the Project Secretariat and consisted of two sub-components: 1) The analysis of two IMW Intercomparison samples and one Working Standard Reference Material (SRM), and 2) the analysis of field replicate samples for several stations. The results of the QA/QC component coordinated by the Project Secretariat are presented in this section of the report.

The QA/QC samples were as follows:

A) Deer Island. A freeze dried (lyophilized) sample of *Mytilus edulis* tissue from a large batch of samples collected several years ago from a coastal site near the Deer Island sewage treatment plant, Boston, Massachusetts USA, homogenized, frozen and subsamples used in a previous IOC/ICES QA/QC exercise for petroleum hydrocarbons. (Farrington et al, 1983). Each laboratory received three sub-samples chosen by random.

B) Staten Island. A batch of mussels collected from Staten Island in the harbor of New York City, New York ,USA, was shucked to obtain tissues, blended, stored frozen (wet), and distributed to the Analytical Centers. Each laboratory received one sub-sample for triplicate analysis. These samples were prepared by Dr. Rodger Dawson and colleagues of the Center of Estuarine and Environmental Studies, University of Maryland, USA for the GESRM Program of IOC.

C) NOAA-NIST. Samples prepared for the U.S. National Oceanic and Atmospheric Administrations Status and Trends Program by the U.S. National Institute of Standards and Technology as a working reference sample of a mussel tissue homogenate (soon to be a Standard Reference Material) were distributed to the IMW Analytical Centers by U.S. NOAA at the request of the Project Secretariat. Each laboratory participated in the NOAA-NIST comparison exercise along with other NOAA-funded labs.

D) IMW Field Samples. At nearly all collection sites, seperate "replicate" field samples were taken. In several cases, seperate analyses of these field replicates were conducted by each Analytical Center; splits of samples from 11 field stations were analyzed by both laboratories.

All data resulting from the analyses of these QA/QC samples were reported directly to the Project Secretariat and were not available to the other Analytical Center until a preliminary report was distributed for the São Paulo data review meeting in April of 1993. A review of the available data prior to the São Paulo meeting led to the discovery that the Analytical Centers had inadvertently reported results from a different working reference material of the NOAA-NIST sample set. This error was subsequently rectified with one laboratory reporting additional data for the correct sample.

In addition to the Analytical Center QA/QC program, participating Host-Country laboratories received splits of field samples, Standard Reference Materials and a working reference freeze-dried tissue sample for analysis. A summary of the results of that exercise is reported in Appendix C.

Detection limits reported by the two Analytical Centers are listed in Table 2. The two laboratories routinely use different philosophies and methodologies in arriving at what they each term "detection" limits. GERG follows U.S. Federal agency requirements and MEL, as a U.N. laboratory, has adopted a UNEP reference method.(See footnotes in Table 2.)

TABLE 2: Detection Limits of IAEA-MEL and Texas A&M GERG Reported as pg/g Sample (dry)

Analyte	MEL LOD* (Sb+3v)	GERG MDL**
Hexachlorobenzene	28	600
Lindane (gamma HCH)	120	2,560
Hexachlorocyclohexane	18	—
2,4'DDE	70	5,460
2,4'DDD	270	7,020
2,4'DDT	110	2,550
4,4'DDE	24	3,740
4,4'DDD	35	1,940
4,4'DDT	18	2,680
Heptachlor	11	2,080
Aldrin	14	2,400
Dieldrin	18	2,860
Mirex	—	1,200
Endrin	33	—
Cis Chlordane(α)	17	2,500
Trans Chlordane(t)	17	—
Trans Nonachlor	12	1,690
Heptachlor epoxide	15	850
Methoxychlor	135	—
CB 8	—	2,120
CB 28	42	1,470
CB 31	45	—
CB 44	—	2,780
CB 49	20	—
CB 52	170	2,400
CB 66/95	—	2,220
CB 101/90	98	6,560
CB 105	42	880
CB 118	24	4,040
CB 128	—	2,120
CB 138/163	45	7,250
CB 149	29	—
CB 153	41	4,700
CB 180	57	1,810
CB 187/182	—	4,720
CB 189	24	—
CB 206	—	1,510
CB 209	—	1,600

* Limit of Detection, calculated according to UNEP Reference Method #57 (1990), using reagent blank (not a field blank).

** Method Detection Limit, calculated according to Fed. Reg. 86:198-99 (1984), using oyster tissue continuing some indigenous level of selected contaminants, thus the actual MDL is less than reported MDL. Estimated Detection Limit, calculated on the basis of 15g (wet) sample size, with 0.2% of total extract injected into the GC-ECD for measurement, is 250pg/gdw for all analytes.

Herein lies a problem that can occur in any international program; even one with central coordination. Each of these laboratories was funded by various funding sources related to other monitoring programs to undertake analyses according to certain specifications which were different for the respective laboratories. Because analytical chemistry contracts were not controlled by the IMW Secretariat and funds were provided directly to each laboratory, the contracts did not specify which method for detection limits to invoke and apply. Neither did they specify analytical methodologies, Standard Reference Materials used, analytes to be measured or reporting standards. Furthermore, funding for the QA/QC was delayed until the same time as the sample analyses funding and the delayed schedule resulted in a decision by the IMW Secretariat and IMW Committee to proceed with all QA/QC and field sample analyses expeditiously. This decision permitted the detection limit misunderstanding to occur and this misunderstanding had to be addressed over a period of several months after the principle analyses were completed, causing confusion as well as a delay in issuing this report. The power of having good QA/QC was clearly demonstrated and did not adversely affect the utility of the combined dataset for the primary purposes of the program. There is no blame to be assigned to either Analytical Center for this misunderstanding; in fact the excellent cooperation of all parties in this complex project have resulted in overall success. Rather, the unfortunate consequence of having to fund the program from various sources, with various contracts, and on a fragmented basis caused delay and confusion that could have been avoided. The lesson learned is to have funding and analytical contract specification more closely coordinated with the central coordinating group responsible for QA/QC and for overall direction of the program.

Overall, MEL's limit of detection (LOD) and GERG's Estimated Detection Limit (MDL) are equivalent in the 10 to 250 pg/g dry weight range (See Table 2 and table footnotes). For this report we have adopted a reporting limit of 250pg/g for each analyte reported in the IMW combined dataset (Appendix A) and have indicated in the data tables any reported concentration below that as "trace" (Tr) unless it was reported by the Analytical Center as below detection limits (N.D.). However, we have retained the original data base reported by the Analytical Centers in order not to discard useful information. These data can be supplied upon request to the IMW Secretariat for the duration of the existence of the Secretariat and thereafter from the Secretary, IOC- Paris. Adoption of the 250pg/g dry weight detection limit does not compromise the important interpretations and conclusions of the MEL and GERG combined dataset for the IMW Initial Implementation Phase.

SPECIFIC QA/QC RESULTS

A) Deer Island.

Representative data for the Deer Island QA/QC samples are presented in Tables 3 and 4, and Figure 3. The within-laboratory precision is good at +/- 5 to 20 % relative standard deviation (r.s.d.). Some of the analytes; i.e. hexachlorobenzene(HCB); heptachlor; and heptachlorexpoxide; 2,4' DDE; and 2,4' DDT; were present in concentrations near or below detection limits for one or both Analytical Centers. The data for dieldrin and 2,4' DDD (Table 3) indicate between-laboratory differences of a factor of two or three which has to be kept in mind when interpreting the field data. MEL data are systematically slightly higher than GERG data when considering the entire set of analytes (Figure 3.); but by less than a factor of two. Otherwise, the agreement between the two laboratories for the Deer Island samples are within state-of-the-art limits for these types of challenging analyses of trace concentration levels.

B) Staten Island.

Data from the Staten Island QA/QC intercomparison are presented in Tables 5 and 6 and Figure 4. The within-laboratory precision is between +/- 5 to 10% for those analytes with reported concentrations well above the 250 pg/g dry weight detection limit; that is for concentrations of 1 ng/g dry weight or above. There are between-laboratory differences of factors of two to three for most of the chlorinated pesticides (Table 5). There is better agreement between laboratories for several of the chlorinated biphenyl congeners, but there is a factor of two difference for CB 52, CB153 and CB180. In contrast to the Deer Island QA/QC data, GERG rather than MEL is systematically higher for the Staten Island samples (Figure 4). The main difference between the Deer Island and the Staten Island QA/QC exercise was the state of the samples when shipped to the laboratories. The Deer Island samples had been freeze dried whereas the Staten Island samples were frozen wet samples. There may have been some difficulties in determining wet weight to dry weight ratios which would account for systematic differences for all analytes.

C) NOAA-NIST.

The NOAA-NIST sample results are presented in Tables 7 and 8, and Figure 5. There are reasonable within laboratory precisions of the order of +/- 5 to 20% r.s.d. The between-laboratory comparison indicates that, as with the Deer Island and Staten Island QA/QC samples, there is a factor of two to three difference between the MEL and the GERG results for 2,4' DDD and dieldrin with GERG reporting the higher concentration. There are also factors of four to five difference between laboratories for the 4,4' DDE and 2,4' DDT concentrations. The concentrations of 2,4' DDE, and heptachlor were near, at, or below detection limits for both laboratories. The agreement between laboratories for individual chlorobiphenyl congeners shows factors of three to ten differences for CBs 18, 28(31), 52, 44, 66/95, 101/90, 180 and 195; for eight of the eighteen CBs analyzed. In contrast to the Deer Island results, the GERG data appears to be systematically higher than the corresponding MEL data (Figure 5).

TABLE 3. IMW Deer Island Interlaboratory Comparison Exercise Between GERG and MEL; Pesticide Concentrations Reported as ng/g dry weight

	HCB	Heptach	Hepta-ep	Chlord	t-Nonach	Dieldrin	2,4'DDE	4,4'DDE	2,4'DDD	4,4'DDD	2,4'DDT	4,4'DDT
MEL												
Sample No.												
1401	0	0.58	0.58	16.9	21.8	6.03	2.22	24.8	1.95	16.3	4.13	7.81
1402	0.12	0.69	0.48	21.8	28.6	9.33	2.54	32.9	1.81	19.2	4.13	10.3
1403	0.06	0.54	0.65	21.2	27.2	10.8	2.9	31.6	2.9	22.1	4.02	9.81
mean	0.06	0.6	0.57	20	25.9	8.72	2.55	29.8	2.22	19.2	4.09	9.31
s.d.	0.06	0.08	0.09	2.71	3.57	2.44	0.34	4.37	0.59	2.86	0.06	1.32
GERG												
Sample No.												
1409	0.39	0.53	0.57	22.7	25.7	1.96	0.55	23.3	6.69	18.4	0	10.3
1410	0.58	1.29	0.87	16.1	23.5	4.17	0.57	22.4	6.38	17.9	0	4.36
1411	0.45	0	0.61	25.8	21.1	2.42	0.43	20.1	5.63	17	0.07	7.39
mean	0.47	0.61	0.68	21.5	23.4	2.85	0.52	21.9	6.23	17.8	0.02	7.35
s.d.	0.1	0.65	0.16	4.95	2.28	1.17	0.08	1.65	0.55	0.71	0.04	2.97

TABLE 4. IMW Deer Island Interlaboratory Comparison Exercise Between GERG and MEL; PCB Concentrations Reported as ng/g dry weight

	Congener Number						
	CB28	CB52	CB105	CB118 108 149	CB138 163	CB153	CB180
MEL							
Sample No.							
1401	7.4	13	10.6	27.2	40	47.7	4.3
1402	7.5	16.6	13.6	32.3	46.9	54.2	4.8
1403	10.3	20	15.4	35.1	53.8	56.7	5.3
mean	8.4	16.5	13.2	31.5	46.9	52.9	4.8
s.d.	1.65	3.5	2.42	4.01	6.9	4.65	0.5
GERG							
Sample No.							
1409	6.27	8.37	9.92	27.4	31.9	35.7	3.33
1410	6.42	12.6	15	29.7	35	39.3	5.26
1411	5.13	8.82	10.4	27.6	33.7	36.2	3.25
mean	5.94	9.93	11.8	28.2	33.5	37.1	3.95
s.d.	0.71	2.32	2.8	1.27	1.56	1.95	1.14

TABLE 5. IMW Staten Island Interlaboratory Comparison Exercise Between GERG and MEL; Pesticide Concentrations Reported as ng/g dry weight

	HCB	Heptach	Hepta-ep	Chlord	t-Nonach	Dieldrin	2,4'DDE	4,4'DDE	2,4'DDD	4,4'DDD	2,4'DDT	4,4'DDT
MEL												
Sample No.												
1448	0.4	0.37	0.39	10.9	8.41	5.82	n.d.	24.7	7.9	29.8	n.d.	2.56
1449	0.3	0.28	0.68	4.44	9.36	7.46	n.d.	21.1	7.55	29.4	n.d.	2.62
1450	0.3	0.28	0.58	4.48	9.45	6.88	n.d.	22.1	7.07	26.3	n.d.	2.92
mean	0.33	0.31	0.55	6.61	9.07	6.72		22.63	7.51	28.50		2.70
s.d.	0.04	0.04	0.11	2.86	0.44	0.60		1.38	0.29	1.47		0.15
GERG												
Sample No.												
1404	Tr	0.65	1.42	25.44	27.06	25.17	3.57	55.18	2.74	34	4.5	4.46
1405	Tr	0.83	1.34	24.17	25.16	24.58	3.54	56.2	2.99	37.25	4.79	4.97
1406	Tr	0.45	1.61	26.76	28.71	27.51	3.41	63.45	3.04	39.31	5.29	4.91
mean		0.64	1.46	25.46	26.98	25.75	3.51	58.28	2.92	36.85	4.86	4.78
s.d.		0.13	0.10	0.87	1.21	1.17	0.06	3.45	0.12	1.90	0.29	0.21

TABLE 6. IMW Staten Island Interlaboratory Comparison Exercise Between GERG and MEL; PCB Concentrations Reported as ng/g dry weight

	Congener Number						
	CB28	CB52	CB105	CB118 108 149	CB138 163	CB153	CB180
MEL							
Sample No.							
1448	8.66	21.6	19.7	39.3	48.3	57.5	9.46
1449	10.5	22.8	16.9	41.8	47	56.3	8.66
1450	9.77	18	15	37.9	42.9	50.5	8.44
mean	9.64	20.80	17.20	39.67	46.07	54.77	8.85
s.d.	0.66	1.87	1.67	1.42	2.11	2.84	0.40
GERG							
Sample No.							
1404	8.6	41.3	20.3	55.5	77.8	101.7	15.9
1405	10.1	39.5	19.2	58.1	77.9	109.6	16.8
1406	10.5	42.4	21	62	82.4	104.5	17.6
mean	9.73	41.07	20.17	58.53	79.37	105.27	16.77
s.d.	0.76	1.04	0.64	2.31	2.02	2.89	0.58

TABLE 7. IMW NOAA-NIST Intercalibration; Results of Triplicate Analysis of Samples QA92TiS4 for Chlorinated Pesticides as ng/g dry weight

	2,4'DDE	4,4'DDE	2,4'DDD	4,4'DDD	2,4'DDT	4,4'DDT	Lindane	Heptachlor	Chlordane	Dieldrin
GERG										
Sample No.										
1443	n.d.	35.8	4.4	24.9	4.1	7	0.52	n.d.	15	5.4
1444	n.d.	43.9	4.7	28.8	5.1	7.7	0.56	n.d.	15	4.8
1445	n.d.	40.5	4.8	29.5	6.1	7.4	0.61	n.d.	17	5.9
mean		40.1	4.6	27.7	5.1	7.4	0.6		15.7	5.6
s.d.		4.1	0.2	2.5	1	0.4	0.05		1.2	0.6
MEL										
Sample No.										
1422	0.33	9.3	10.1	33.1	<0.12	2.2	4.3	0.33	7.5	1.8
1425	0.36	9.1	9.7	24.8	<0.12	2.1	3.5	0.25	6.9	1.7
1426	0.43	9.7	8.1	27.7	<0.12	3.3	4.2	0.33	8	2.5
mean	0.37	9.4	9.3	28.5	0	2.5	4	0.3	7.5	2
s.d.	0.05	0.31	1.1	4.2	0	0.67	0.4	0.05	0.6	0.4

TABLE 8. IMW NOAA-NIST Intercalibration; Results of Triplicate Analysis of Samples QA92TiS4 Chlorobiphenyl Congeners as ng/g dry weight

	Chlorobiphenyl Congener						
	CB28	CB52	CB105	CB118 108	CB138 163	CB153	CB180
GERG							
Sample No.							
1443	51	59	36	84	103	127	30
1444	55	62	45	98	112	130	33
1445	56	63	46	94	114	129	32
mean	54	61	42	92	110	129	32
s.d.	2.6	2.1	5.5	7.2	5.9	1.5	1.5
MEL							
Sample No.							
1422	9.1	19	24	59	68	68	6.6
1425	11	18	24	61	73	75	6.8
1426	9.2	16	29	63	71	73	8.9
mean	9.8	18	26	61	71	72	7.4
s.d.	1.1	1.5	2.9	2	2.5	3.6	1.3

FIGURE 3. Comparison of MEL and GERG Data, Deer Island Data for all Analytes (ng/gdw)

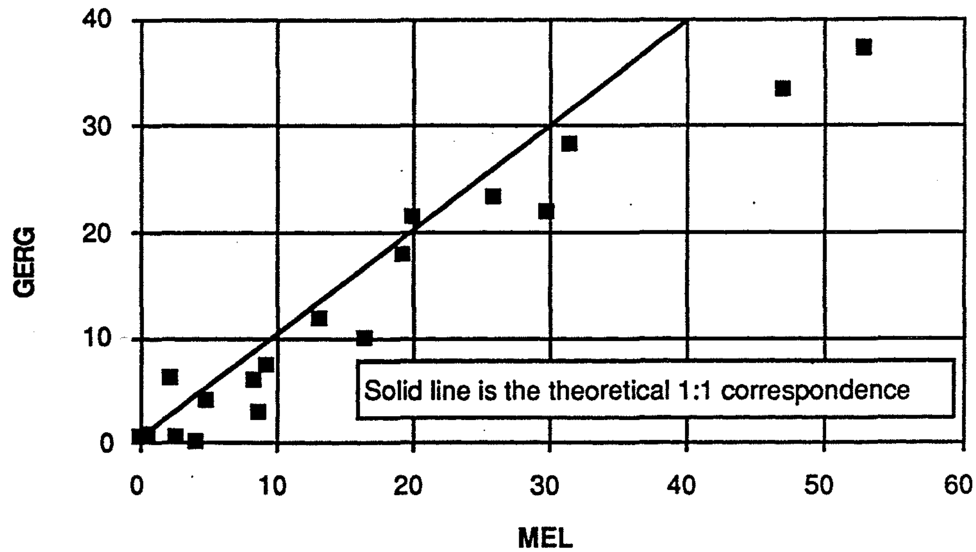


FIGURE 4. Comparison of MEL and GERG Data, Staten Island Data, Staten Island Data for all Analytes (ng/gdw)

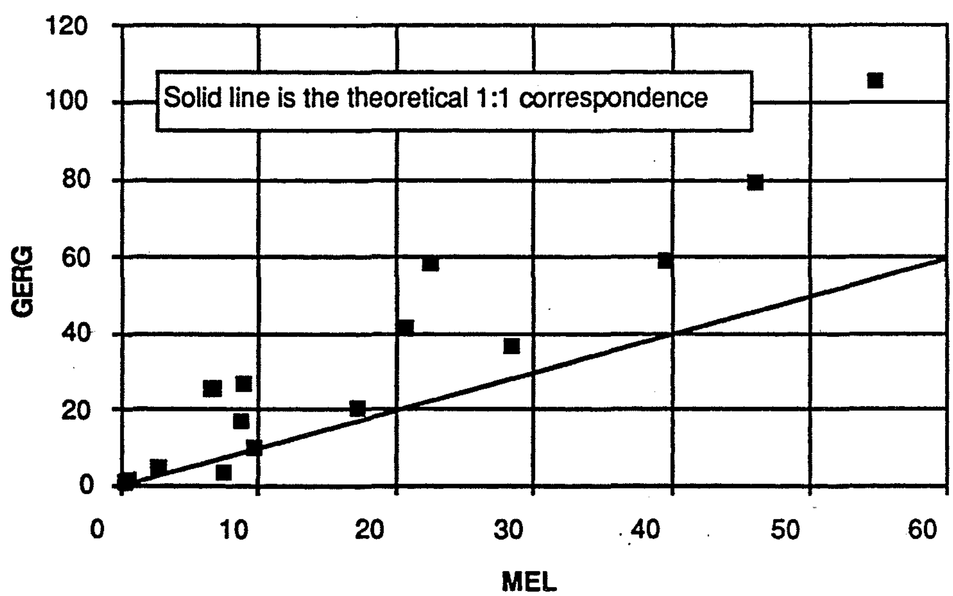
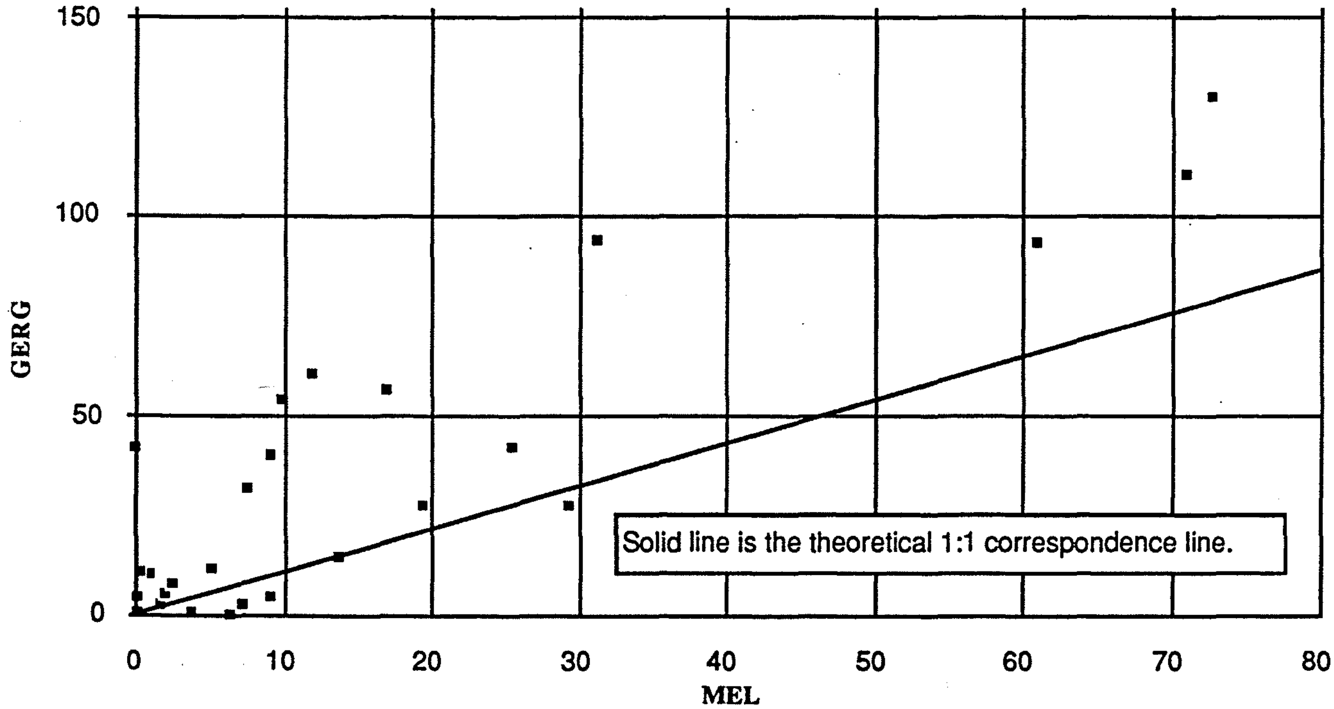


FIGURE 5. IMW NOAA-NIST Mussel Tissue IV Intercalibration (QA92TiS4) Compare all Chlorobiphenyl and Chlorinated Pesticide Data as ng/gdw



The NOAA-NIST sample is a working reference material that has been analyzed by a larger set of laboratories but the analytical data can be assessed within the context of the results of this project (Table 9 and Figures 6 and 7). These preliminary comparisons taken with permission from a draft NOAA report show that GERG and MEL were generally within +/- one standard deviation from the consensus mean for analytes with the following exceptions : MEL's concentrations for 4,4' DDE, CB18, CB44, CB66/95,101/90 were between one and two standard deviations below the consensus mean, and MEL's concentration for CB195 was greater than the consensus mean by more than one standard deviation; GERG's concentration for CB 180 was higher than the consensus mean by more than two standard deviations. During final data interpretation, NOAA coordinators may revise the consensus means and standard deviations as a result of checks for data transcription errors and elimination of outliers by statistical treatment of the data set.

Participation of the IMW Analytical Centers within the larger group of NOAA-NIST laboratories provides a valuable QA/QC check on IMW results and provides a framework for cross comparison of IMW data with other bivalve tissue chlorinated pesticide and chlorobiphenyl data. Participation in the NOAA-NIST intercomparison activities or similar exercise should be a continuing requirement for the IMW Analytical Centers in future phases.

D) IMW Field Samples.

Representative results for analyses of splits of the replicate field samples are presented in Tables 10 and 11, and Figures 8 and 9. Much of the field sample data are near, at, or below the limits of detection and we would not expect close agreement between the two laboratories. Overall, given the low concentrations of the analytes in several of the field-collected samples, the results of the QA/QC are encouraging.

There is excellent agreement for the dry weight determination (Figure 10) which eliminates this factor as a cause of any significant discrepancies between laboratories for the pesticide and CB analytes. For those samples where analyte concentrations are significantly above the detection limits, the agreement between laboratories is usually very good, and generally within a factor of two or better. IMW samples of particular concern with apparent significant differences between laboratories are sample nos. 1153-54 for 4,4' DDE, 2,4' DDD; sample nos. 1175-76 for 2,4' DDD and 4,4' DDD; and sample nos. 1279-80 2,4' DDD ; and for gamma chlordane concentrations, sample nos. 1153-54 and 1193-94.

There may be a slight systematic difference between GERG and MEL for dry weight to wet weight ratio and for lipid concentrations (Table 10 and Figures 10 and 11). This may account for some of the variability between these two laboratories for some samples. It might be that one laboratory has an extraction method which yields more lipid or is more efficient for lipids and associated chlorinated- lipophilic compounds such as chlorobiphenyls and chlorinated pesticides.

TABLE 9. QA/QC Results for IMW NOAA-NIST Mussel Tissue IV QA92TiS4

ANALYTE	MEL	GERG	CONSENSUS MEAN*	s.d.*	r.s.d.(%)*
	ng/g. dry wt.				
CB 8	1.74	2.27	3.3	2.4	72
CB 18	1.1	10.2	11	5.4	49
CB 28/31	9.85	54	43.7	20.1	46
CB52	17.1	56.8	55.9	11.2	20
CB44	0.08	42	31.7	11.9	38
CB 66/95	12	60.3	85	29	34
CB 101/90	31.3	93.5	101	22	21
CB 118	60.9	93.3	96.6	22.6	23
CB 153	72.8	130	122	36	29
CB 105	25.5	41.9	40.3	10.8	27
CB138/163*	71.1	110	106	30	28
CB 187/182	19.4	27.1	26.3	8.7	33
CB 128	13.8	14.7	14	5	36
CB 180	7.67	31.9	9.2	2.3	25
CB 170/190	0.12	0	1.5	0.9	61
CB 195	6.46	0	1.1	1	98
CB 206	0.02	0.03	4.2	7.1	168
CB 209	0	0.79	0.8	0.9	103
HCB	0.37	0.1	0.4	0.5	116
g HCH	3.83	0.56	3.5	4.2	120
HEPTACHLOR	0.33	0	1.3	1.5	116
ALDRIN	0.05	4.53	2.5	2.3	92
HEPTACHL-E	0.23	0.43	4.4	5.1	115
DDE - 2,4'	0.38	10.9	15.8	12.9	82
c-CHLORDANE	7.3	2.55	18.7	9.1	49
t-NANOCHLOR	5.24	11.4	13	4.2	32
DDE - 4,4'	9.24	40.4	45.2	4.2	9
DIELDRIN	2.02	5.39	13.4	11.7	88
DDD - 2,4'	9.28	4.69	11.3	5.1	45
DDD - 4,4'	29.3	27.5	39.5	37.6	95
DDT - 2,4'	0.12	4.62	6.3	4.3	68
DDT - 4,4'	2.62	7.37	10.3	4.3	42
MIREX	0.15	0.43	1.3	1	79

* Data from NIST-NOAA; courtesy of NOAA Status and Trends programs.
Final data report may contain slightly revised means and s.d. and r.s.d.

FIGURE 6. IMW NOAA-NIST Mussel Tissue IV Intercomparison: QA92TiS4 Cholorbiphenyl Data

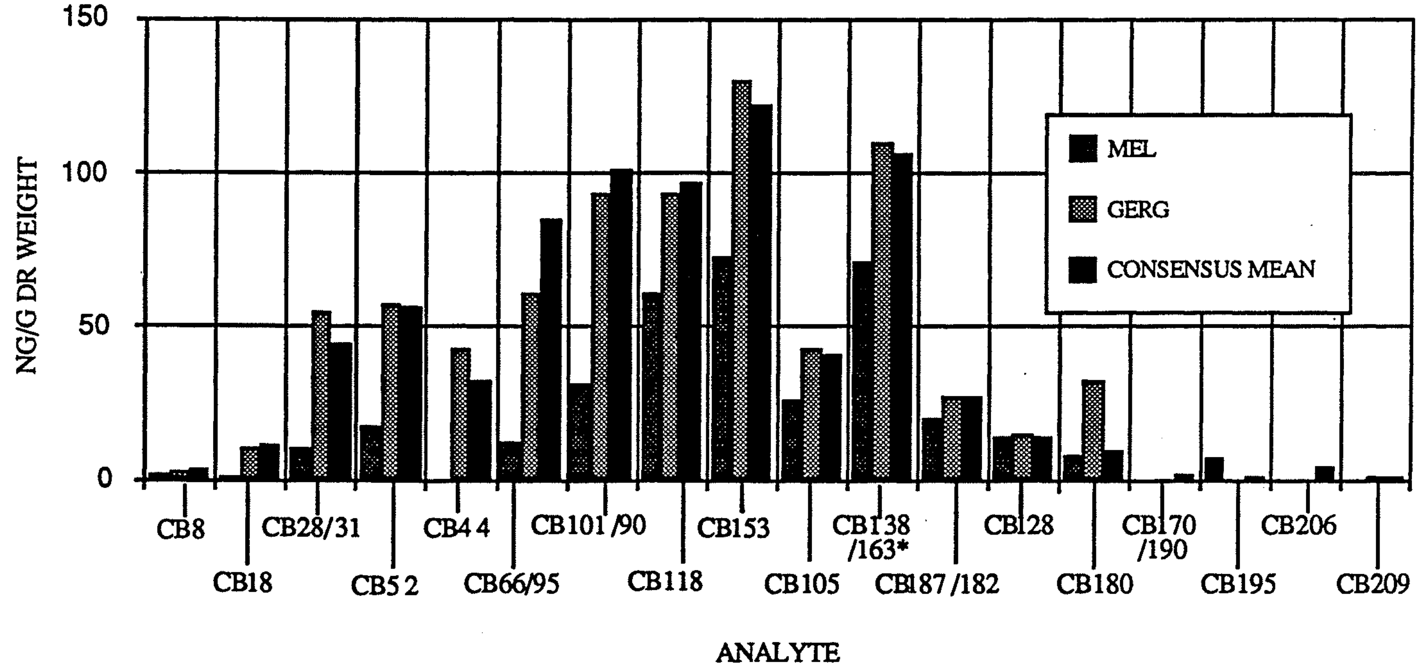


FIGURE 7. IMW NOAA-NIST Mussel Tissue IV Intercomparison: QA92TiS4 Chlorinated Pesticide Data

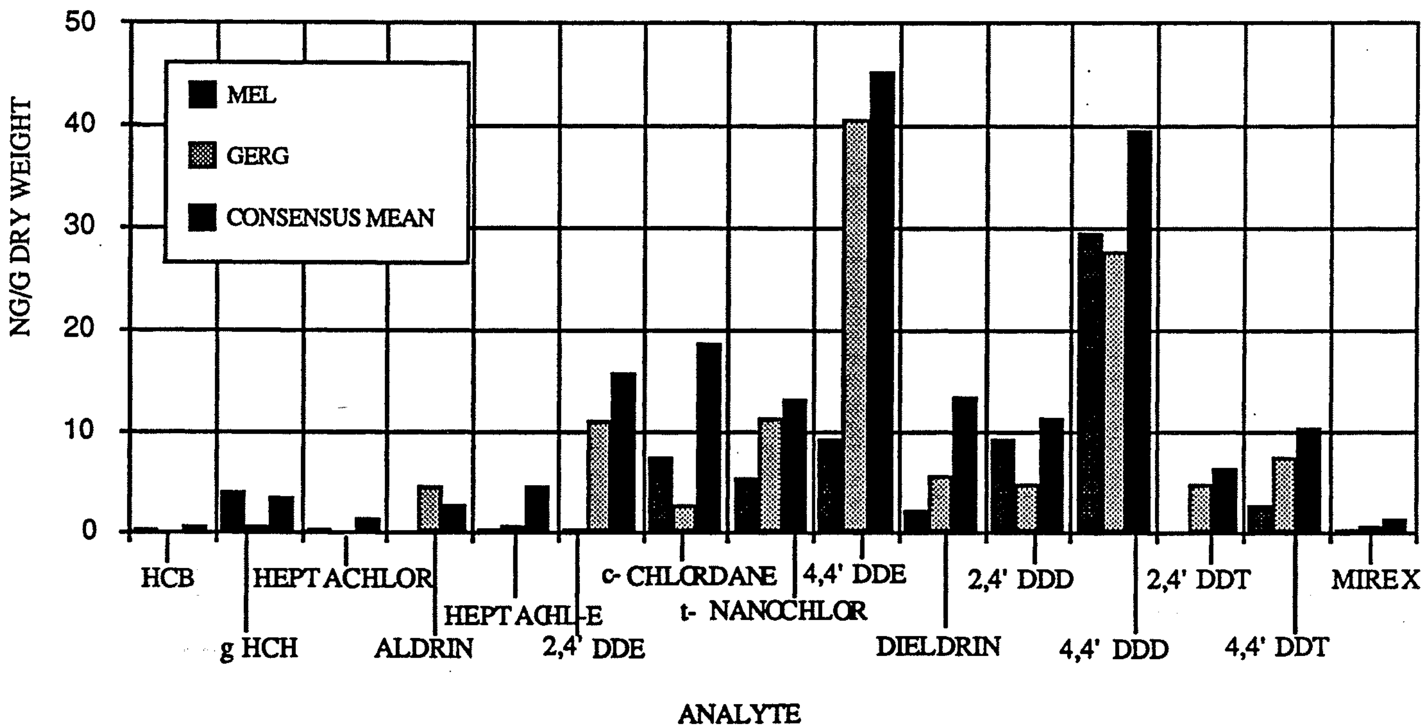


TABLE 10. QA/QC IMW Comparison of Results of Analysis of Field Replicates

ID No.	Code	Dry/Wet ratio	Lipid mg/g dry wt.	a-HCH	b-HCH	2,4' DDE	4,4' DDE	2,4' DDD	4,4' DDD	2,4' DDT	4.4' DDT
				ng/g dry weight*							
1077	CREC	0.18	27	0	0	0	2.8	0	2	0	0
1078	CREC	0.13	21	0.2	0.6	0	2.6	0	1	0.4	0
1153	BRSB	0.21	126	5.8	60	0.7	32	1.2	5	0	2.3
1154	BRSB	0.21	74	3.9	51	0.6	6.1	0.5	1.5	0	1.2
1175	BRFO	0.16	43	0	0.4	0	49	2.3	36	0	5.9
1176	BRFO	0.16	44	0.3	0.2	0	52	9.1	103	0	11
1193	BRGB	0.23	135	1.3	24	0	13	2.1	8.2	0.2	1.1
1194	BRGB	0.2	80	0.7	28	0.7	6.9	2.9	11	0	3.1
1239	PEPA	0.16	60	0	0	0	0.6	0	0	0	1.3
1240	PEPA	0.14	48	0.6	0.2	0	11	0.4	2	0	2.2
1241	PEPA	0.2	110	0	0.3	0	11	0	0.6	0	1.7
1242	PEPA	0.19	100	0.3	0.2	0.2	8.8	0.4	2	0.3	0.7
1247	ECCR	0.1	38	0	0.5	2.7	15	0.4	11	0.4	1.4
1248	ECCR	0.09	35	0.2	0	0	9.8	0.6	5.5	0	0.6
1267	JABO	0.16	89	0	0.7	0.5	3	0	0.9	0.1	0.8
1268	JABO	0.16	60	0	0	0	0	0.2	1	0	1.2
1279	MELO	0.08	77	0	0	1.1	118	1.8	41	1	5
1280	MELO	0.09	64	0.2	0.2	0.8	53	15	31	0	11
1313	CUCC	0.18	55	0	0.4	0.2	1.2	0	0.7	0	0.4
1314	CUCC	0.15	50	0	0	0	1.7	0	0	0	0

* NOTE: Use detection limit of 0.12 ng/g dry wt. All values at or below that limit are recorded as 0.

TABLE 11. QA/QC IMW Comparison of Results of Analysis of Field Replicates

ID No.	Code	Lindane	Chlordane	CB 101	PCBs CB 138 163	CB 153
		ng/g dry weight *				
1077	CREC	0	1.2	0.2	0.4	0.3
1078	CREC	1	1.8	0.5	0.5	0.8
1153	BRSB	2.4	5.2	1.3	6.5	4.1
1154	BRSB	0.6	0.9	1.8	4	4.4
1175	BRFO	1	0.8	0.6	3.7	1
1176	BRFO	0.4	0.3	0.8	1.9	2
1193	BRGB	2.1	13	7	13	13
1194	BRGB	0.5	2.2	6	8.9	8.2
1239	PEPA	0	0	0.6	2.8	1.9
1240	PEPA	0.5	0	0.8	2.1	2.3
1241	PEPA	0	0	0.6	3.2	1.5
1242	PEPA	0.5	0	0.9	1.8	2.3
1247	ECCR	0.2	0.9	0.4	2.4	0.2
1248	ECCR	0.3	0	0.3	0.3	0.3
1267	JABO	0	0.3	0	1.4	0.5
1268	JABO	0.3	0	0	0.5	0.8
1279	MELO	0.6	0.4	0.9	3.4	3.8
1280	MELO	0.4	0.4	0.5	3.2	6
1313	CUCC	0.6	0	0.2	1.3	0
1314	CUCC	0.1	0	0.2	0.6	0.6

* NOTE: Detection limit 0.12 ng/g dry wt. All values at or below that concentration are recorded as 0.

FIGURE 8. Comparison of MEL and GERG Field Replicate Analyses; DDT Family Compound Data (ng/gdw)

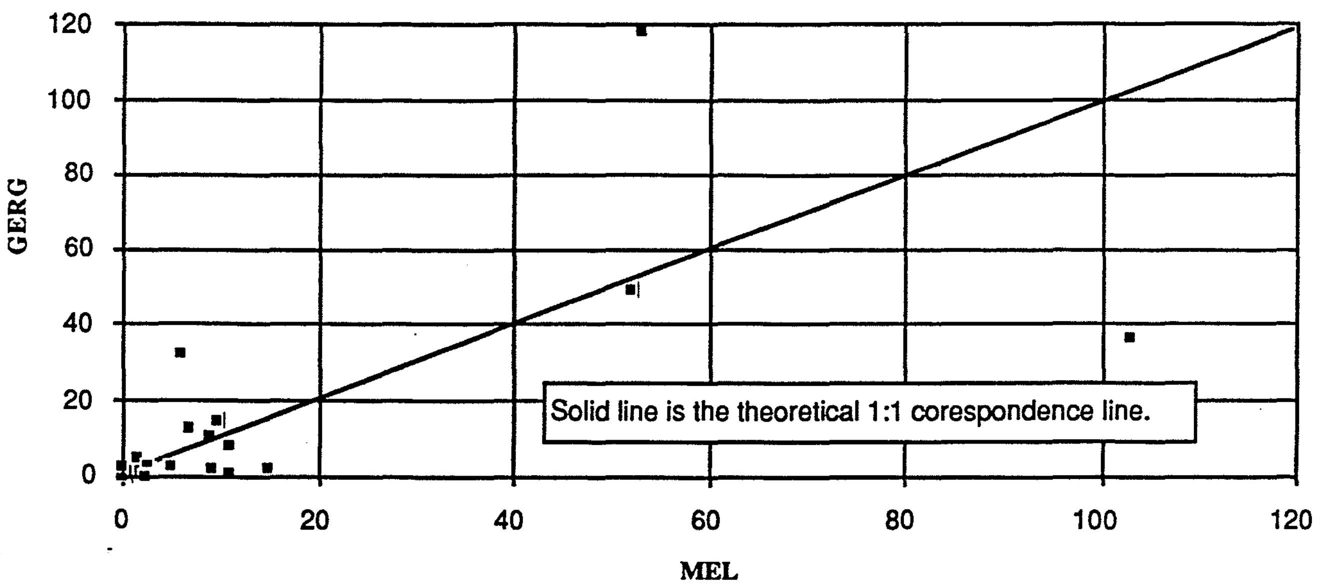
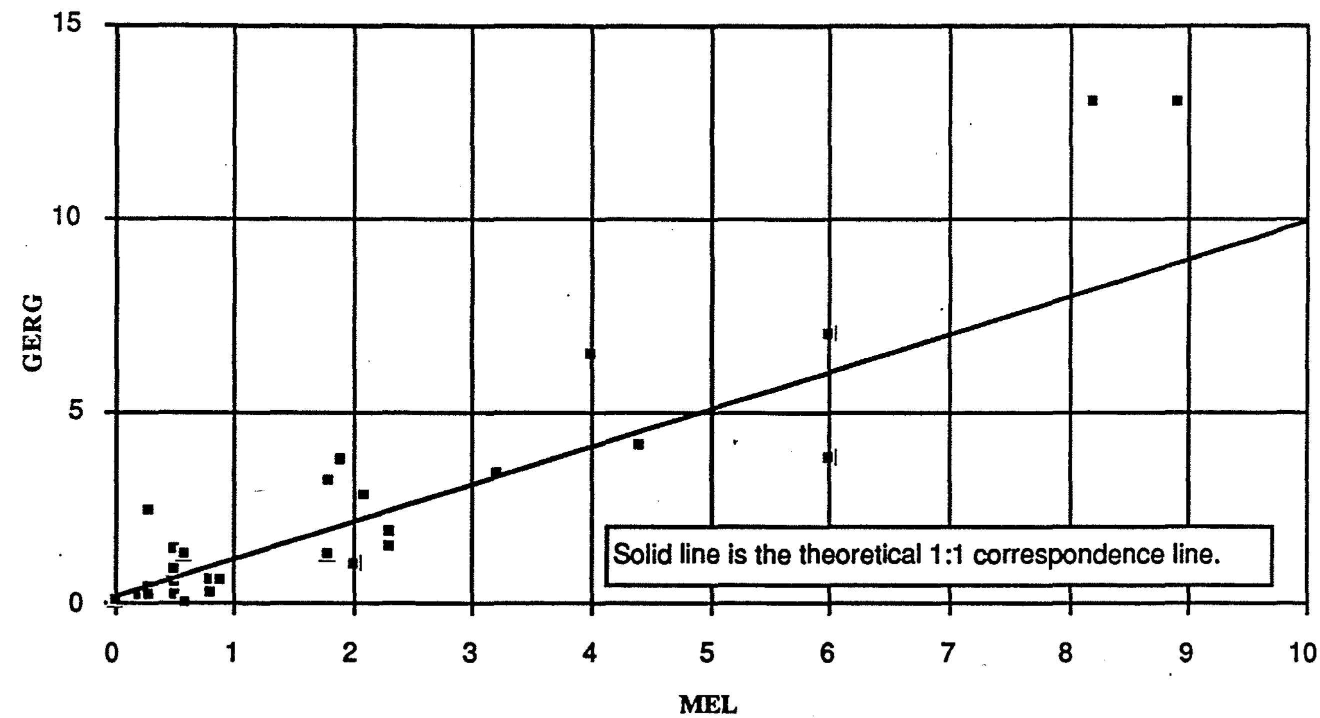


FIGURE 9. Comparison of MEL and GERG Field Replicate Analyses; PCB Inividual Chlorobiphenyl Data (ng/gdw)



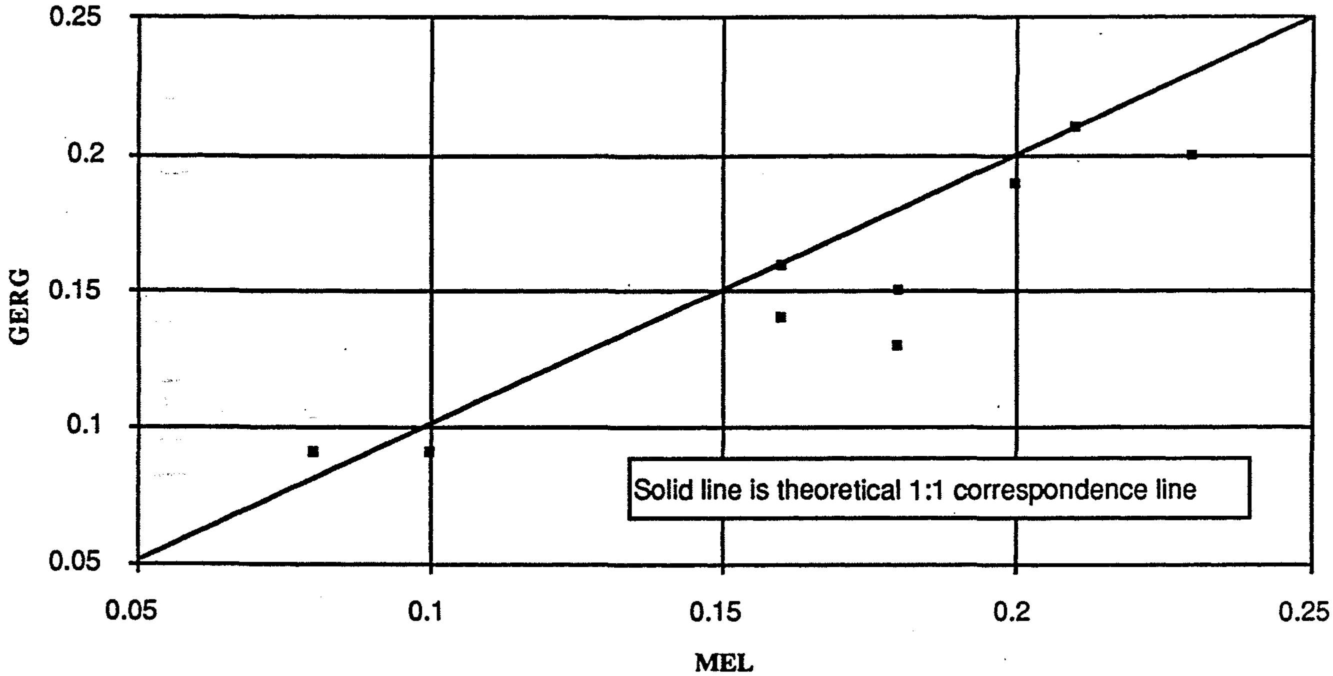


FIGURE 10. Comparison of MEL and GERG Field Replicate Analyses; Dry Weight/Wet Ratio

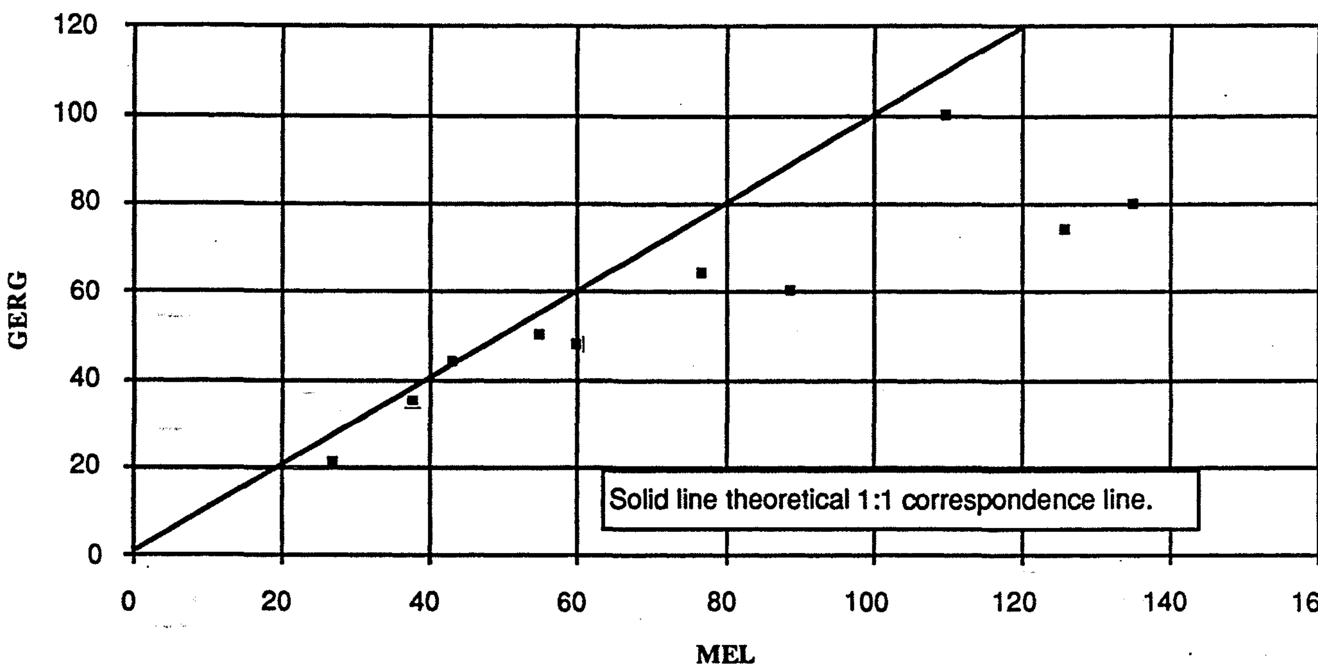


FIGURE 11. Comparison of MEL and GERG Field Replicate Analyses; Lipid Concentrations (mg/gdw)

Interlaboratory QA/QC is an essential component for any regional program involving multiple analysts and it's importance cannot be overstated. If the QA/QC effort is not initiated prior to the analysis of field samples, data interpretation delays and other difficulties are likely and may even compromise the program.

E) Summary of QA/QC Data

There was general agreement between the two Analytical Centers within factors of two to four for analyte concentrations which are above the limits of detection by at least a factor of four (i.e. for concentrations 1 ng/g dry weight or higher). These QA/QC results provide a framework for interpretation of the entire field data set . For example, differences of factors two to three between stations cannot be accepted as significant if the data were not produced by the same laboratory.

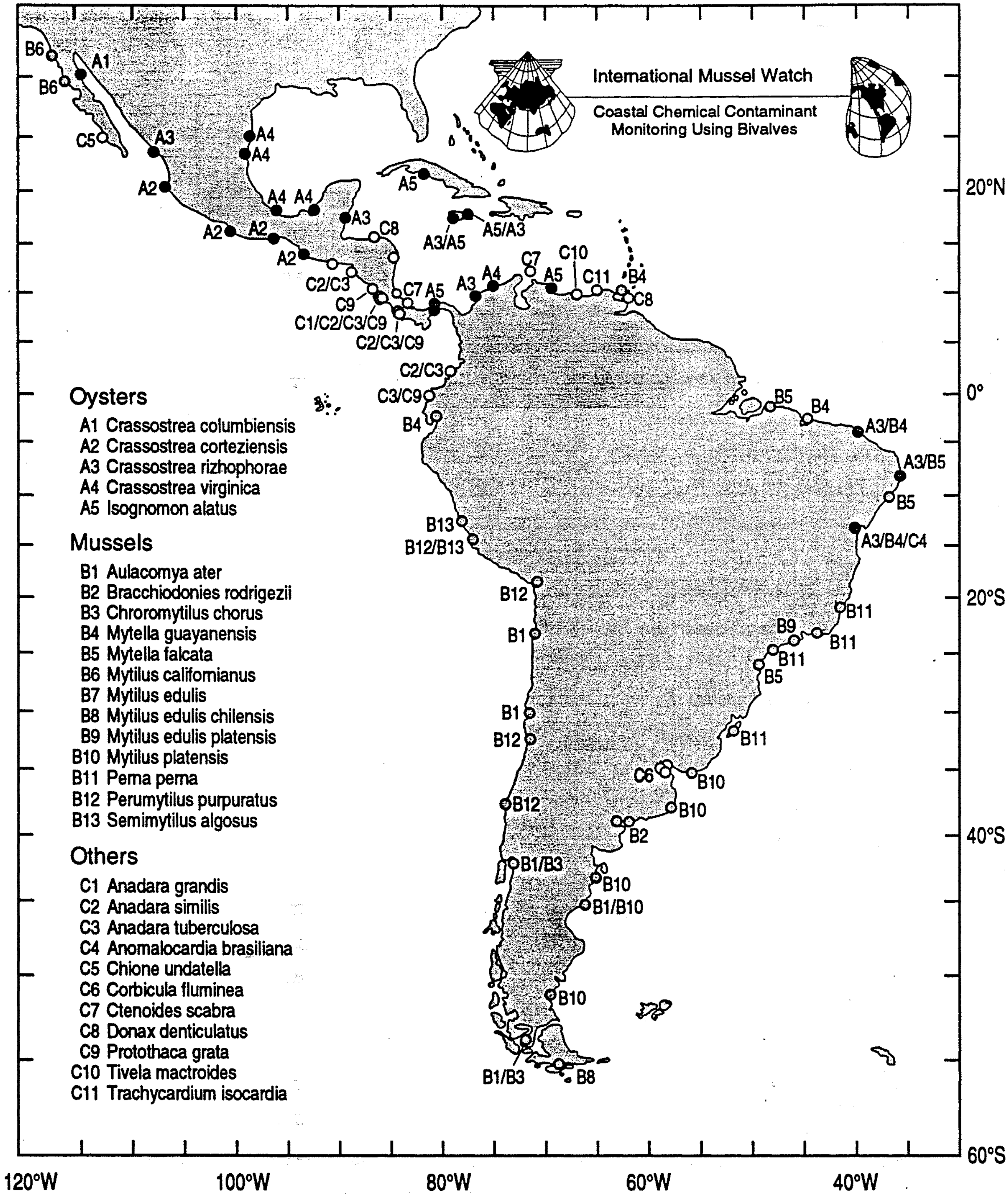
Results and Discussion of Combined IMW Dataset

The combined set of IMW data as produced from the analysis of field-collected samples by the two IMW Analytical Centers is appended (Appendix A). Some of the results are discussed in this section.

COMPARISON OF CONCENTRATIONS BETWEEN DIFFERENT SPECIES

One of the main objectives of the International Mussel Watch Project is to compare the occurrence and concentrations of selected trace organic contaminants among sampling locations. Although bivalves have been targeted as the sentinel organism for the study, it was not possible to collect the same species at every location because of the large extent of the area under study. This issue must be faced by any monitoring program which involves organisms and covers a broad tropical-subtropical-temperate range. There are only a few coastal areas in the IMW South and Central America and Caribbean combined data set where the same species was present in more than four to five stations in sequence. Figure 12 illustrates the distribution of the different species of bivalves sampling during this study.

The IMW Project has collected a larger number of species throughout the region than have been collected by other national programs, for example, in the U.S. NOAA Status and Trends Program (primarily three species). Most other national programs are limited to one to three species. Understanding how species differences might influence comparisons of chemical concentration data between and among stations is essential to the interpretation of this data set. Fortunately, the sampling strategy made


International Mussel Watch
Coastal Chemical Contaminant Monitoring Using Bivalves
Oysters
A1 Crassostrea columbiensis
A2 Crassostrea corteziensis
A3 Crassostrea rizhophorae
A4 Crassostrea virginica
A5 Isognomon alatus
Mussels
B1 Aulacomya ater
B2 Bracchiodonies rodrigezii
B3 Chroromytilus chorus
B4 Mytella guayanensis
B5 Mytella falcata
B6 Mytilus californianus
B7 Mytilus edulis
B8 Mytilus edulis chilensis
B9 Mytilus edulis platensis
B10 Mytilus platensis
B11 Perna perna
B12 Perumytilus purpuratus
B13 Semimytilus algosus
Others
C1 Anadara grandis
C2 Anadara similis
C3 Anadara tuberculosa
C4 Anomalocardia brasiliana
C5 Chione undatella
C6 Corbicula fluminea
C7 Ctenoides scabra
C8 Donax denticulatus
C9 Protothaca grata
C10 Tivela mactroides
C11 Trachycardium isocardia
20°N
0°
20°S
40°S
60°S
120°W
100°W
80°W
60°W
40°W

provisions for collection of multiple species at several stations and we have sufficient data from this and other programs to address this issue.

The collection of different species of bivalves might complicate the comparison of analytical results and further analysis of the data. Fortunately, some species have been found to coexist at the same locations (Figure 12 and Table 12). The chemical analysis of these species will assist in the decision whether or not it is appropriate to compare trace organic concentrations encountered in different organisms and/or the limitations of such comparisons. The following species-by-species sections discuss the similarities and differences in the concentrations of the total HCHs, DDTs, chlordanes and PCBs, on a dry weight basis, among the different species listed in Table 12. This comparison is not comprehensive because we do not have data for age, sex, or reproductive stage which may differ for the various species sampled and these factors do influence tissue concentration of contaminants.

Anadara tuberculosa, Anadara similis and Protothaca grala

These organisms have been collected from under the roots of mangroves in several stations, including Colombia, Costa Rica, and Ecuador. Figures 13 and 14 compare the concentrations of total HCH, DDTs, chlordanes and PCBs encountered in *Anadara tuberculosa, Anadara similis and Protothaca grata*.. Results indicate that the concentrations measured in one species are, in general, accompanied by similar concentrations in the other species. Concentrations of total HCHs, chlordane, DDTs and PCBs differ by less than a factor of three between these species and indicating no preferential uptake and retention of analytes by either of the two *Anadara* species. The same analysis, however, seems to indicate that *Protothaca grata* tends to accumulate these trace organic contaminants to a slightly greater extent than both *Anadara* species. The observed differences are very small and too few samples were analyzed to detect with any certainty systematic differences between species.

Crassostrea rizhophorae, Isognomon alatus, Anomalocardia brasiliana, Mytella falcata and Mytella guayanensis

Although not all these organisms were found at the same sites, they all were collected in areas were *Crassostrea rizhophorae* was also found. *Crassostrea rizhophorae* and *Isognomon alatus* were found attached to the roots of mangroves in Jamaica. In Brazil, *Crassostrea rizhophorae* was collected within one hundred meters from the areas where *Anomalocardia brasiliana, Mytella guayanensis or Mytella falcata* were sampled.

Figure 15 indicates that *Crassostrea rizhophorae* does not accumulate HCHs, DDTs, chlordanes and PCBs to the same extent, compared to *Isognomon atatus* and *Mytella falcata*,. The concentrations, however, do not differ by more than a factor of three. No clear differences can be

TABLE 12: Co-existing Bivalves Sampled at IMW Stations in Latin America

Anadara tuberculosa *Anadara similis* *Protothaca grala*	*Mytella guayanensis* *Anomalocardia brasiliana* *Crassostrea rizhophorae*
Crassostrea rizhophorae *Isognomon alatus*	*Crassostrea rizhophorae* *Mytella falcata*
Aulacomya ater *Choromytilus chrous*	*Aulacomya ater* *Mytilus platensis*
Semimytilus algosus *Perumytilus purpuratus*	

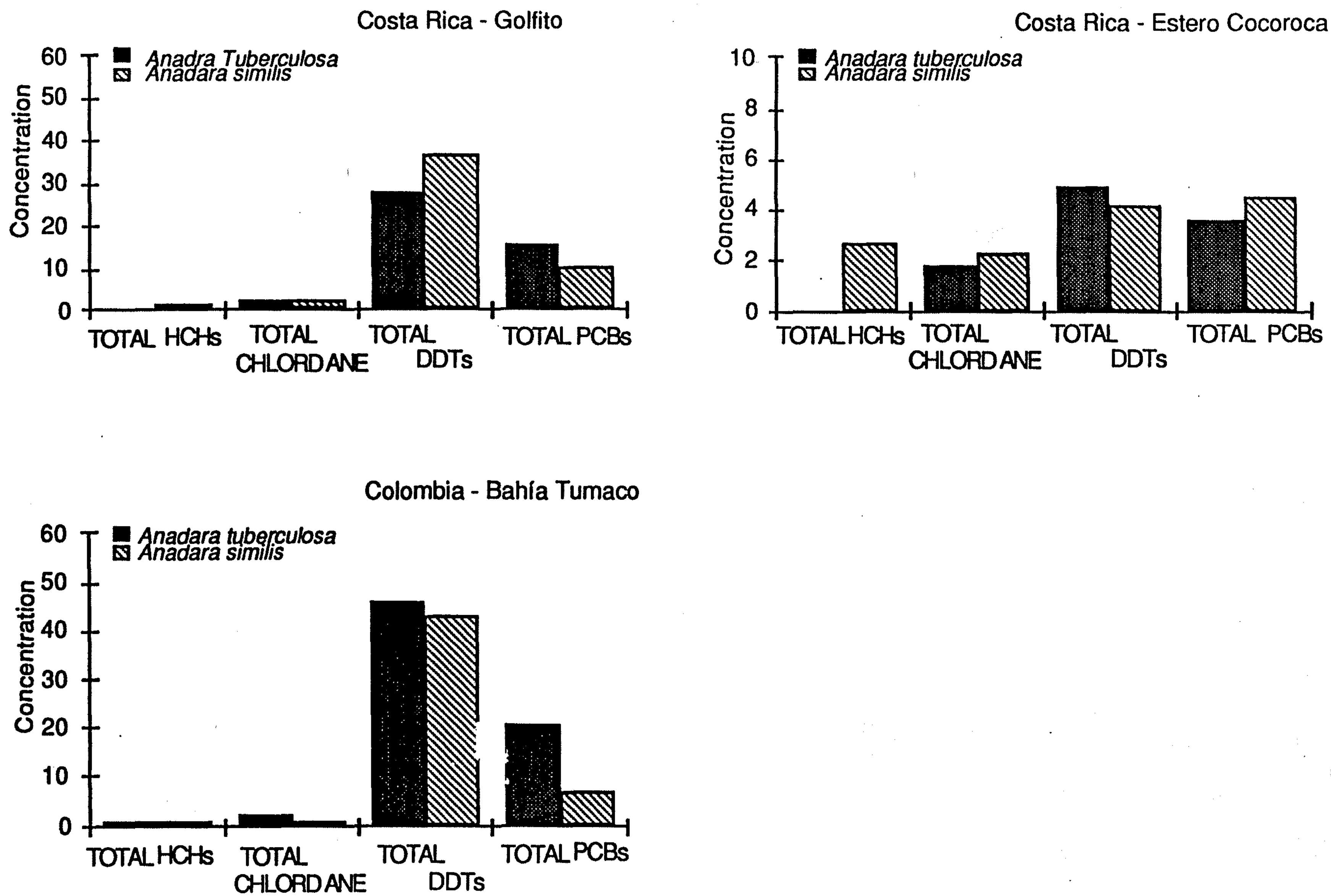


FIGURE 13: Costa Rica, Colombia

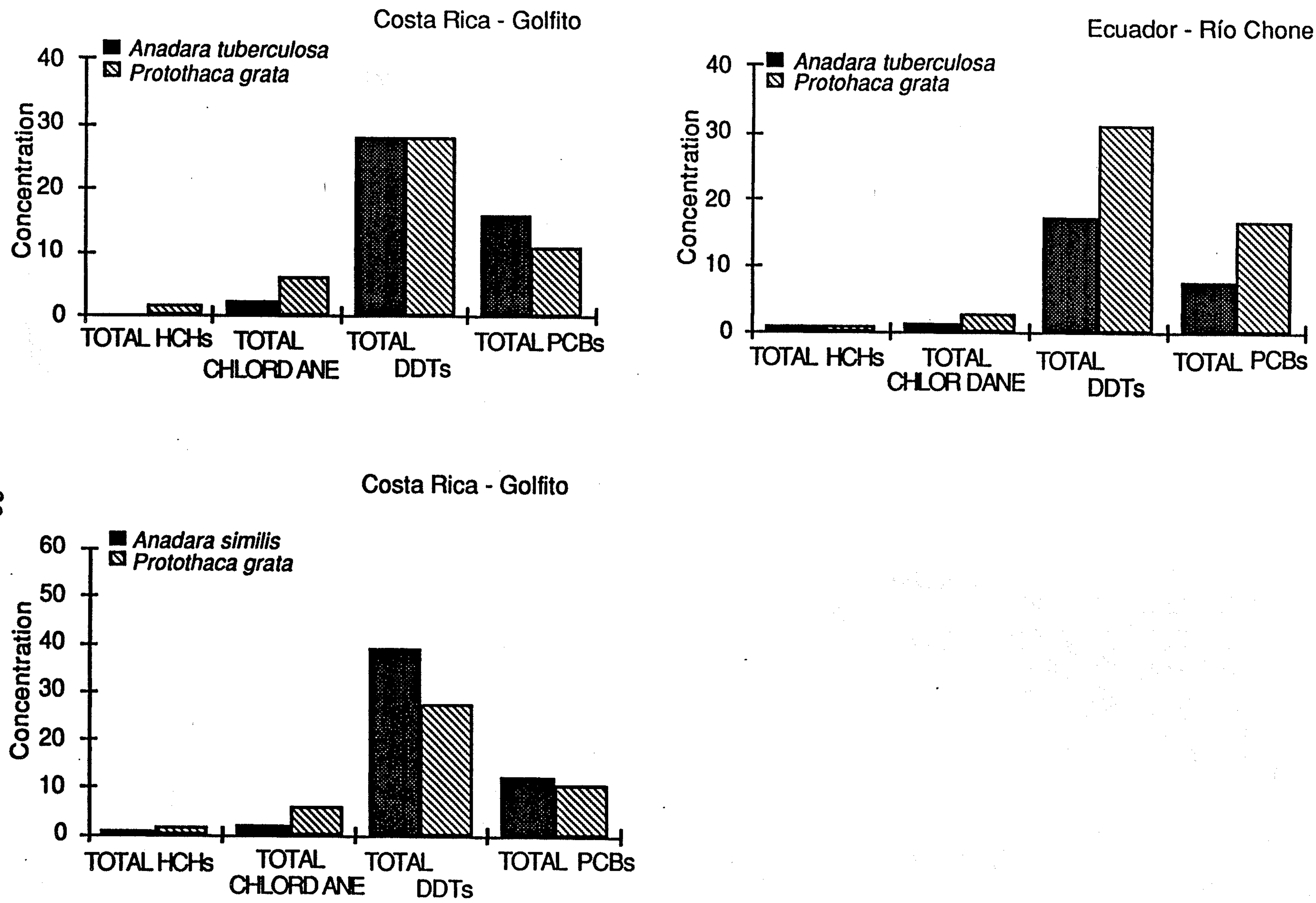


FIGURE 14: Costa Rica, Ecuador

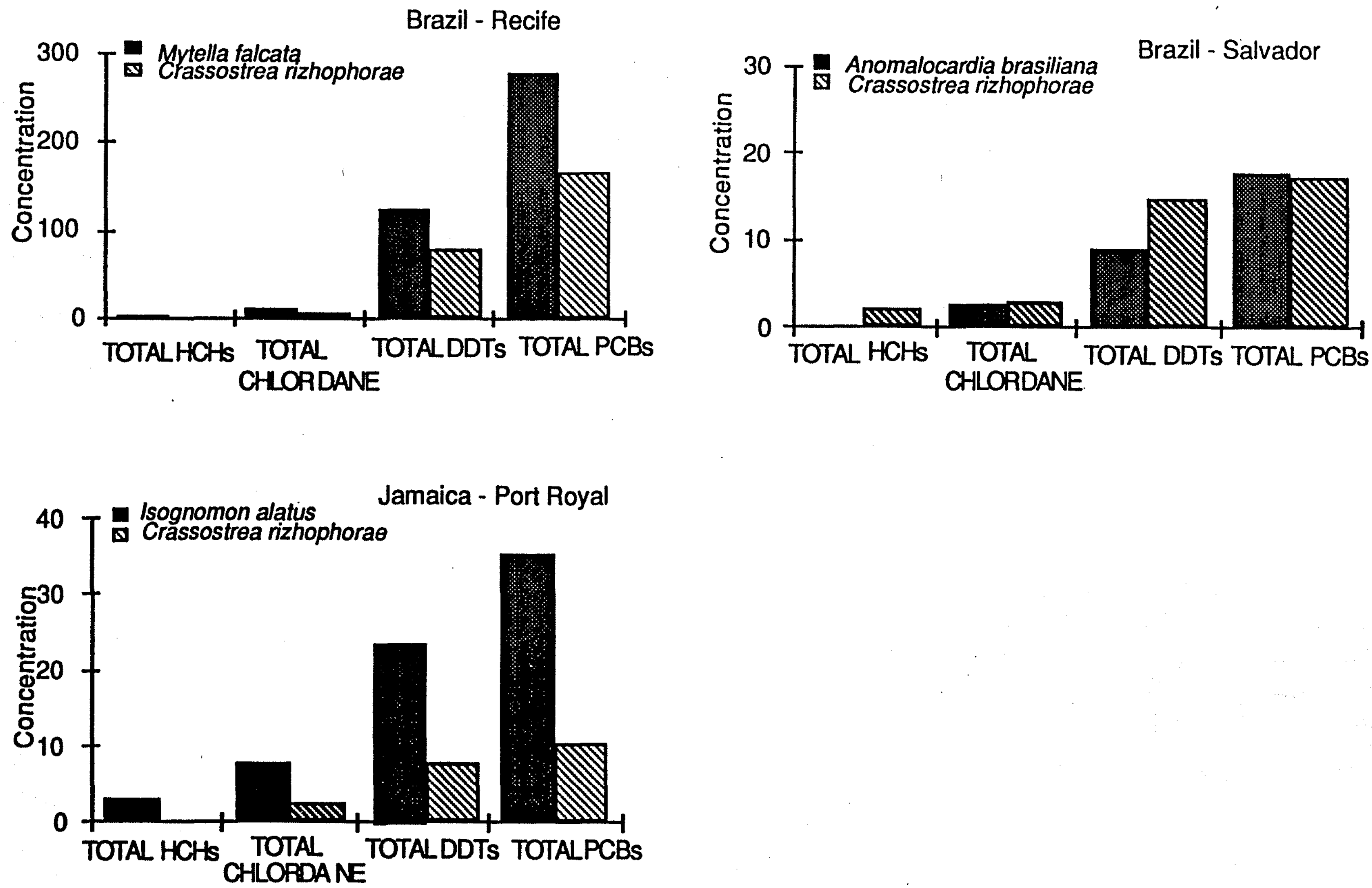


FIGURE 15: Brazil, Jamaica

observed when the concentrations measured in *Crassostrea rizhophorae* are compared to those encountered in *Mytella guayanensts* or *Anomalocardia brasiliana.*

If *Crassostrea rizhophorae* is used as a reference to link these species, it is reasonable to expect that, when exposed to the same environmental concentrations, *Isognomon alatus* will accumulate these chemicals to a slightly larger extent than *Mytella falcata, Mytella guayanensis* and *Anomalocardia brasiliana.* Except for total chlordane, the concentrations will be within a factor of two to three. The differences observed among *Mytella falcata, Mytella guayanensis* and *Anomalocardia brasiliana* are small.

Aulacomya ater, Choromytilus chorus **and** ***Mytilus platensis***

Aulacomya ater was found to share substrate with two different species of mussels, *Choromytilus chorus and Mytilus platensis,* in Chile and Argentina, respectively. As shown in Figure 16, *Aulacomya ater* seems to contain slightly higher concentrations of HCHs, chlordanes, DDTs and PCBs compared to the other two species of mussels. The concentrations observed in *Aulacomya ater*, however, are not larger than threefold higher than those measured in *Choromytilus chorus* or *Mytilus platensis.*

Semimytilus algosus **and** ***Perumytilus purpuratus***

These two species of mussels were collected off the rocky coasts off Paracas, Peru. Concentration differences (Figure 16) between both species were small, i.e. less than 50%, for all analytes.

General Comment

In spite of being exposed to the same environmental habitat concentrations of HCHs, chlordanes, DDTs and PCBs, there appear to be several small differences when comparing tissue concentrations in species collected at the same or nearby sites. Most tissue concentration differences were within a factor of three or less but these differences are of interest when trying to understand the relationships between habitat exposure and tissue concentration in different species. These small differences permit the broad global region comparisons we originally sought to make in the IMW program even though there were several species sampled. In a similar study with oysters and mussels for the NOAA's National Status and Trends Program, O'Connor (1991) similarly reported concentration differences for total PAHs, DDTs, PCBs and chlordanes to be within a factor of two to three.

CHLORINATED PESTICIDES AND PCBS

In this discussion of the results of analysis of samples from the IMW Phase I Region, we utilize summary plots of data for ease of viewing, but remind the reader that all the data are presented in tabular form in Appendix A. We will not attempt an exhaustive interpretation of the IMW data in this report. Our purpose is to present the first order interpretations

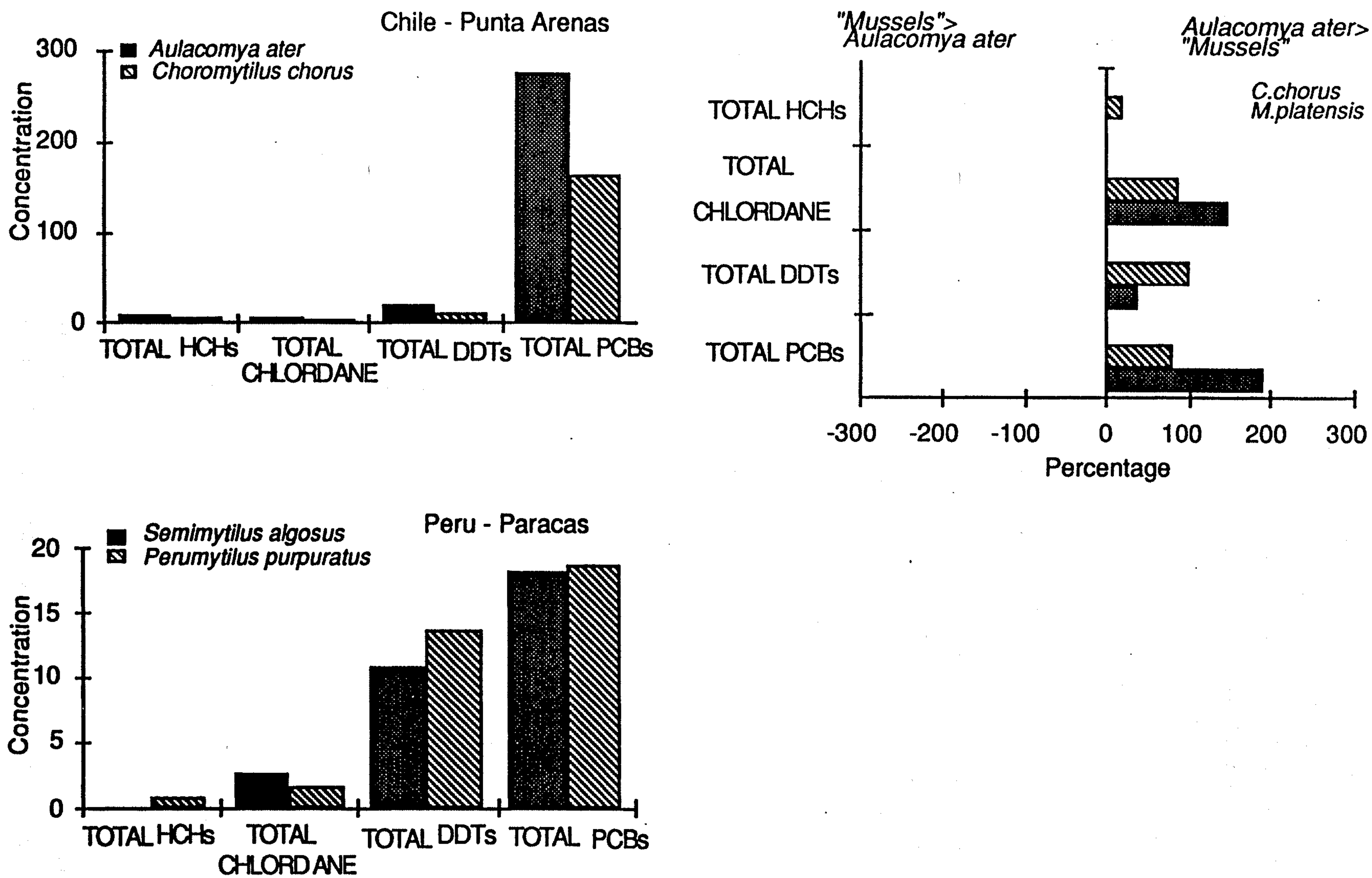


FIGURE 16: Chile, Peru

and to make the data generally available. We believe that these IMW data will be more fully interpreted over time by comparison with local sets of data in conjunction with Host-Country scientists and that the project has indeed provided a "springboard for action". A summary report to be published in the scientific literature is in preparation.

The total DDT concentrations (sum of DDD, DDE, and DDT) in the samples from the IMW collection taken along the coast of Central and South America and the Caribbean (Figure 17) are within the range found for the United States coasts during the same sampling period of 1991-1992 (NOAA unpublished data). To provide a nearby direct comparison with the IMW data, the NOAA Status and Trends Stations for the Gulf of Mexico are listed in Table 14. DDT data for these NOAA Status and Trends Mussel Watch Gulf of Mexico stations (Figure 18) can be directly compared to the IMW data subset for the Caribbean area (Figure 19) because GERG was the analytical laboratory for these NOAA S&T samples. All of these data show a similarity for the range of DDT concentrations encountered.

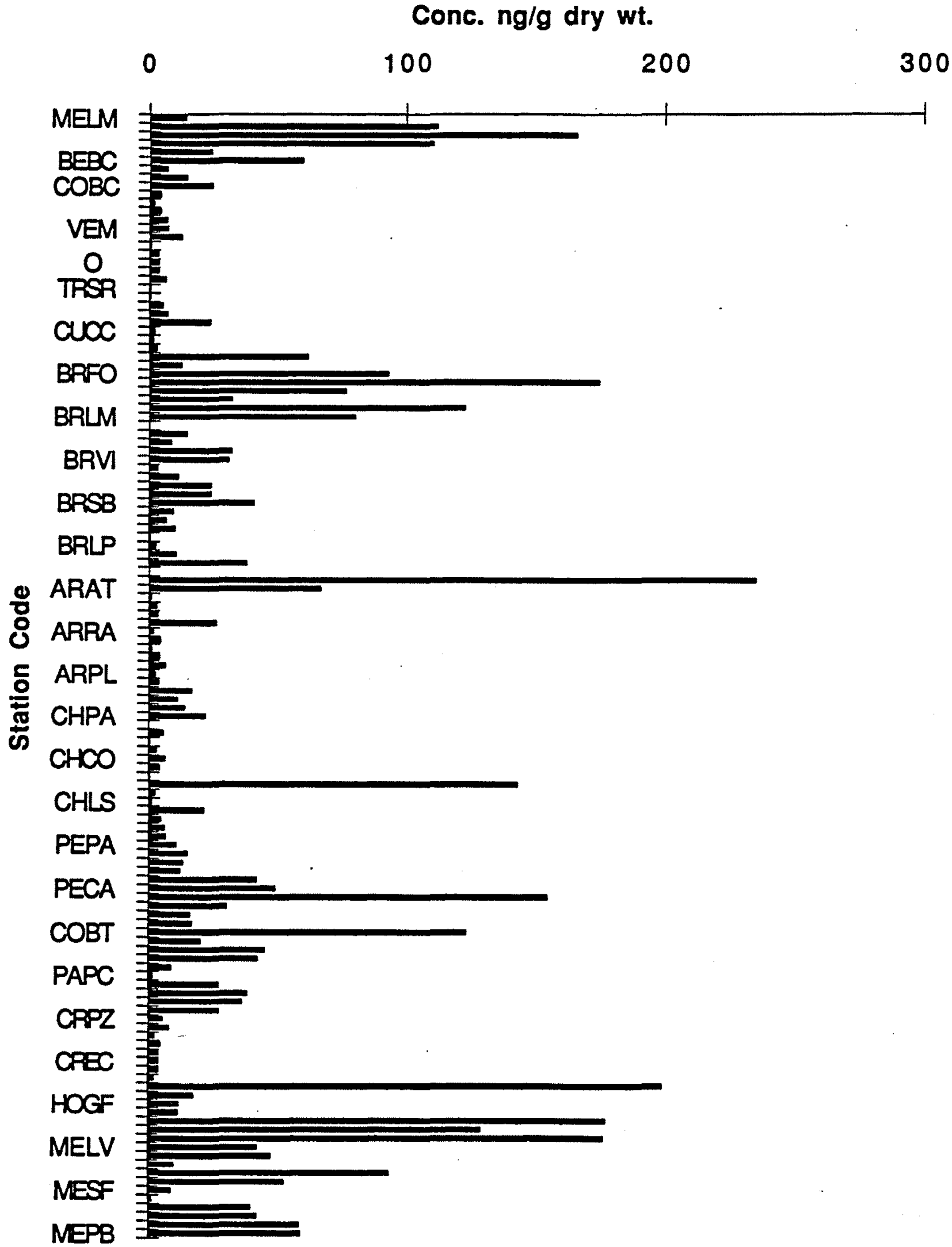
Beta HCH concentrations are present in the IMW samples at, or below, the limit of detection with the exception of about a dozen samples (Figure 20). In particular, stations ARHU, ARAT, TRCS, BRSB, CHPA, and MEAP deserve attention for elevated concentrations in comparison to other stations. The stations with the higher concentrations of beta HCH in the IMW data set (Figure 20) have concentrations distinctly higher compared to the NOAA Status and Trends Mussel Watch data for the Gulf of Mexico (Figure 21).

Lindane concentrations are elevated compared to most of the IMW stations for the samples from stations ARHU, ARAT, ARRA, and CHPA (Figure 22). The highest concentrations are above those reported for the NOAA S&T Gulf of Mexico samples but the main portion of the samples have similar concentrations for both the IMW and the NOAA Status and Trends Gulf of Mexico samples (Figures 23).

Chlordane concentrations are elevated at two stations, ARHU and ARAT compared to a generally low concentration at most IMW stations (Figure 24). The high chlordane concentrations for the three IMW stations are higher than for any of the NOAA Status and Trends concentrations, but the major portion of the concentrations in the IMW data set are similar to concentrations found along the Gulf of Mexico and other U.S. Coasts. (O'Connor, 1991).

The ARHU and ARAT samples also have chlorobiphenyl concentrations that are significantly elevated compared to the concentrations at other IMW stations (Figure 25). PCB contamination of the Central-South American and Caribbean coasts as indicated in concentrations of selected chlorobiphenyl congeners is similar to that for the United States Gulf of Mexico coast as indicated in comparing the major portion of the data for the IMW data (Figure 25) with the NOAA Status and Trends Mussel Watch Gulf of Mexico data (Figure 26). This is similar to much of the chlorinated pesticide data for which there was general comparability of concentration ranges

FIGURE 17. Total DDT Concentration South and Central America

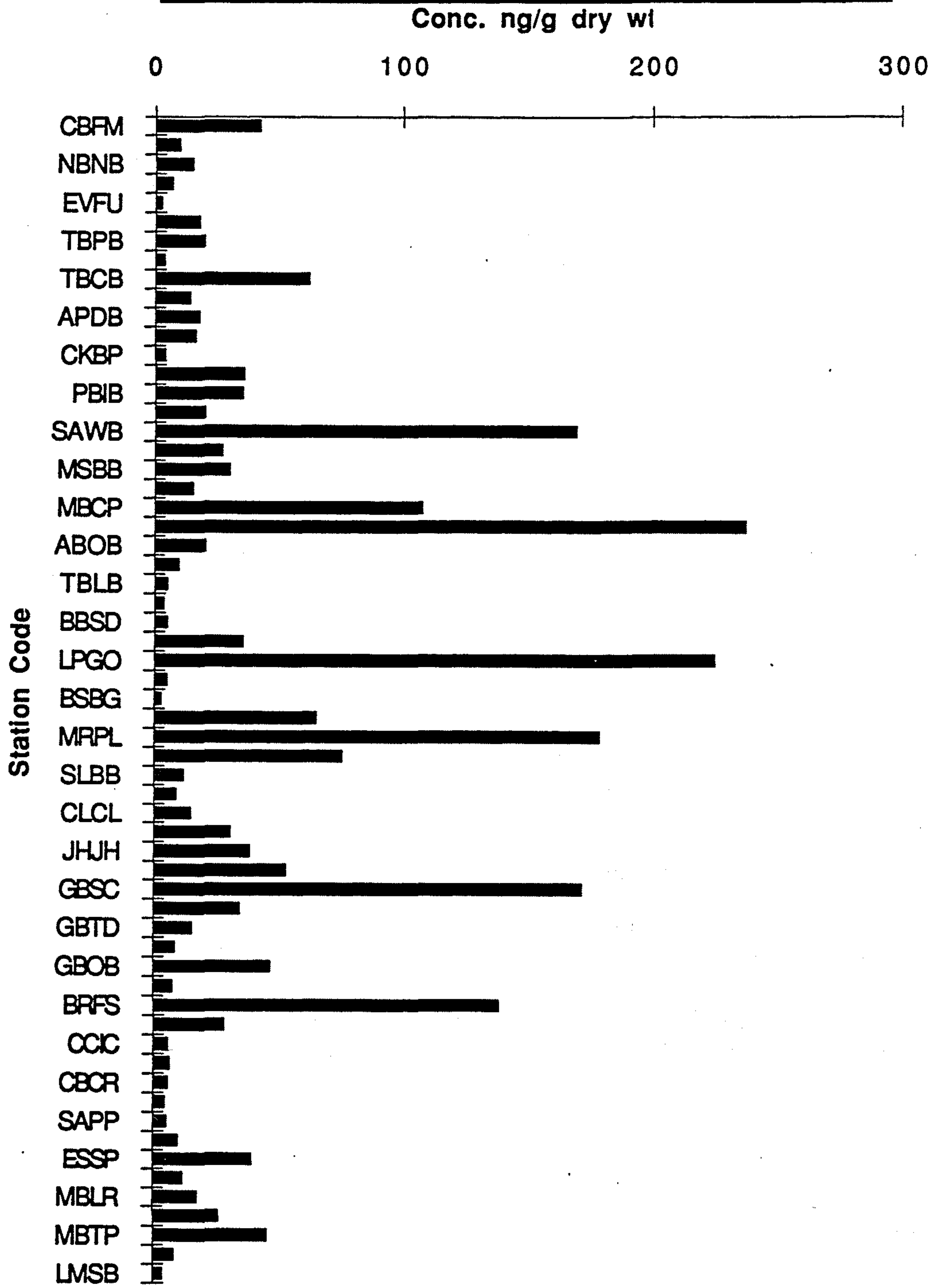


Total DDT sum as reported by analyst

TABLE 14: NOAA Gulf of Mexico Station Locations and Identification Code

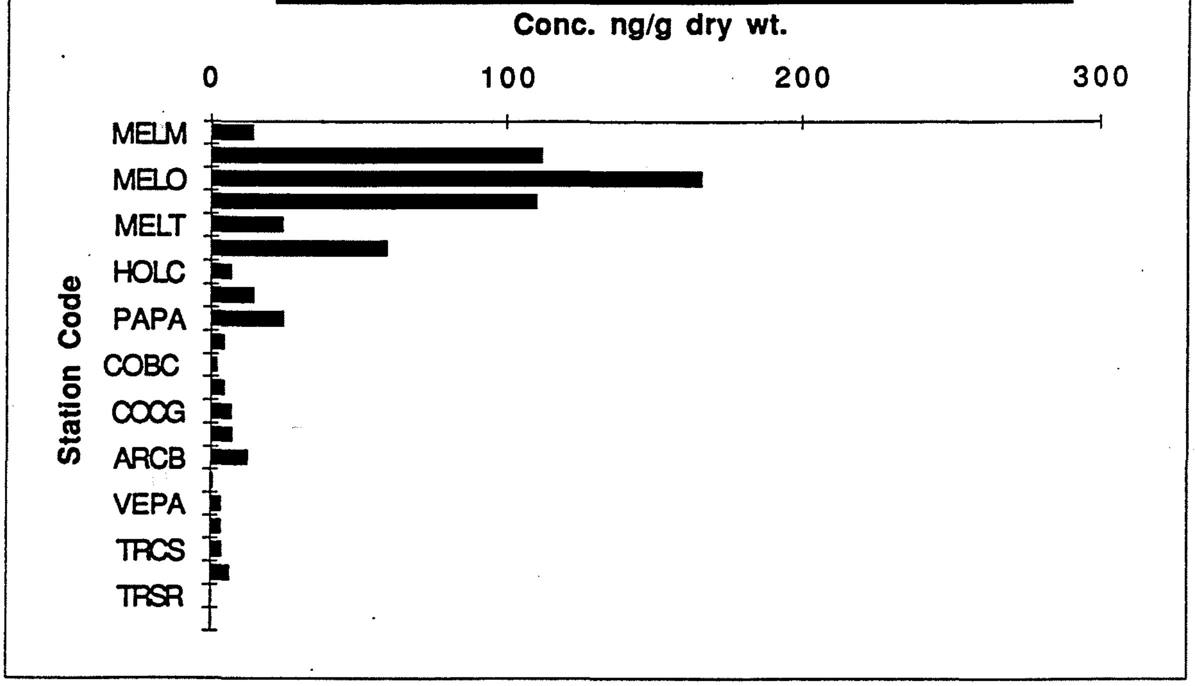
SITE	General Location	Specific Location		SITE	General Location	Specific Location	
CBFM	Charlotte Harbor	Fort Meyers	FL	BSBG	Breton Sound	Bay Gardene	LA
CBBI	Charlotte Harbor	Bird Island	FL	BSSI	Breton Sound	Sable Island	LA
NBNB	Naples Bay	Naples Bay	FL	MRPL	Mississippi River	Pass A Loutre	LA
RBHC	Rookery Bay	Henderson Creek	FL	MRTP	Mississippi River	Tiger Pass	LA
EVFU	Everglades	Faka Union Bay	FL	SLBB	Sabine Lake	Blue Buck Point	TX
TBOT	Tampa Bay	Old Tampa Bay	FL	CLSJ	Calcasieu Lake	St. Johns Island	LA
TBPB	Tampa Bay	Papys Bayou	FL	CLCL	Caillou Lake	Caillou Lake	LA
TBHB	Tampa Bay	Hillsborough Bay	FL	JHJH	Joseph Harbor Bayou	Joseph Harbor Bayou	LA
TBCB	Tampa Bay	Cockroach Bay	FL	VBSP	Vermilion Bay	Southwest Pass	LA
TBMK	Tampa Bay	Mullet Key Bayou	FL	GBSC	Galveston Bay	Ship Channel	TX
APDB	Apalachicola Bay	Dry Bar	FL	GBYC	Galveston Bay	Yacht Club	TX
APCP	Apalachicola Bay	Cat Point Bar	FL	GBTD	Galveston Bay	Todds Dump	TX
CKBP	Cedar Key	Black Point	FL	GBHR	Galveston Bay	Hanna Reef	TX
PBPH	Pensacola Bay	Public Harbor	FL	GBOB	Galveston Bay	Offatts Bayou	TX
PBIB	Pensacola Bay	Indian Bayou	FL	GBCR	Galveston Bay	Confederate Reef	TX
CBSR	Choctawhatchee Bay	Off Santa Rosa	FL	BRFS	Brazos River	Freeport Surfside	TX
SAWB	St. Andrews Bay	Watson Bayou	FL	CCNB	Corpus Christi	Nueces Bay	TX
MSPC	Mississippi Sound	Pass Christian	MS	CCIC	Corpus Christi	Ingleside Cove	TX
MSBB	Mississippi Sound	Biloxi Bay	MS	ABLR	Aransas Bay	Long Reef	TX
MSPB	Mississippi Sound	Pascagoula Bay	MS	CBCR	Copano Bay	Copano Reef	TX
MBCP	Mobile Bay	Cedar Point Reef	AL	MBAR	Mesquite Bay	Ayres Reef	TX
MBHI	Mobile Bay	Hollingers Is. Chan.	AL	SAPP	San Antonio Bay	Panther Point Reef	TX
ABOB	Atchafalaya Bay	Oyster Bayou	LA	SAMP	San Antonio Bay	Mosquito Point	TX
CLCL	Caillou Lake	Caillou Lake	LA	ESSP	Espiritu Santo	South Pass Reef	TX
TBLB	Terrebonne Bay	Lake Barre	LA	ESBD	Espiritu Santo	Bill Days Reef	TX
TBLF	Terrebonne Bay	Lake Felicity	LA	MBLR	Matagorda Bay	Lavaca River Mouth	TX
BBSD	Barataria Bay	Bayou Saint Denis	LA	MBGP	Matagorda Bay	Gallinipper Point	TX
BBMB	Barataria Bay	Middle Bank	LA	MBTP	Matagorda Bay	Tres Palacios Bay	TX
LPGO	Lake Pontchartrain	Gulf Outlet	LA	MBEM	Matagorda Bay	East Matagorda	TX
LBMP	Lake Borgne	Malheureux Point	LA	LMSB	Lower Laguna Madre	South Bay	TX

FIGURE 18. Total DDT Concentration
NOAA S&T Gulf of Mexico, 1991-92



Total DDT summed from NOAA data, including all "DDT" components

FIGURE 19. Total DDT Concentration
IMW Caribbean Sites



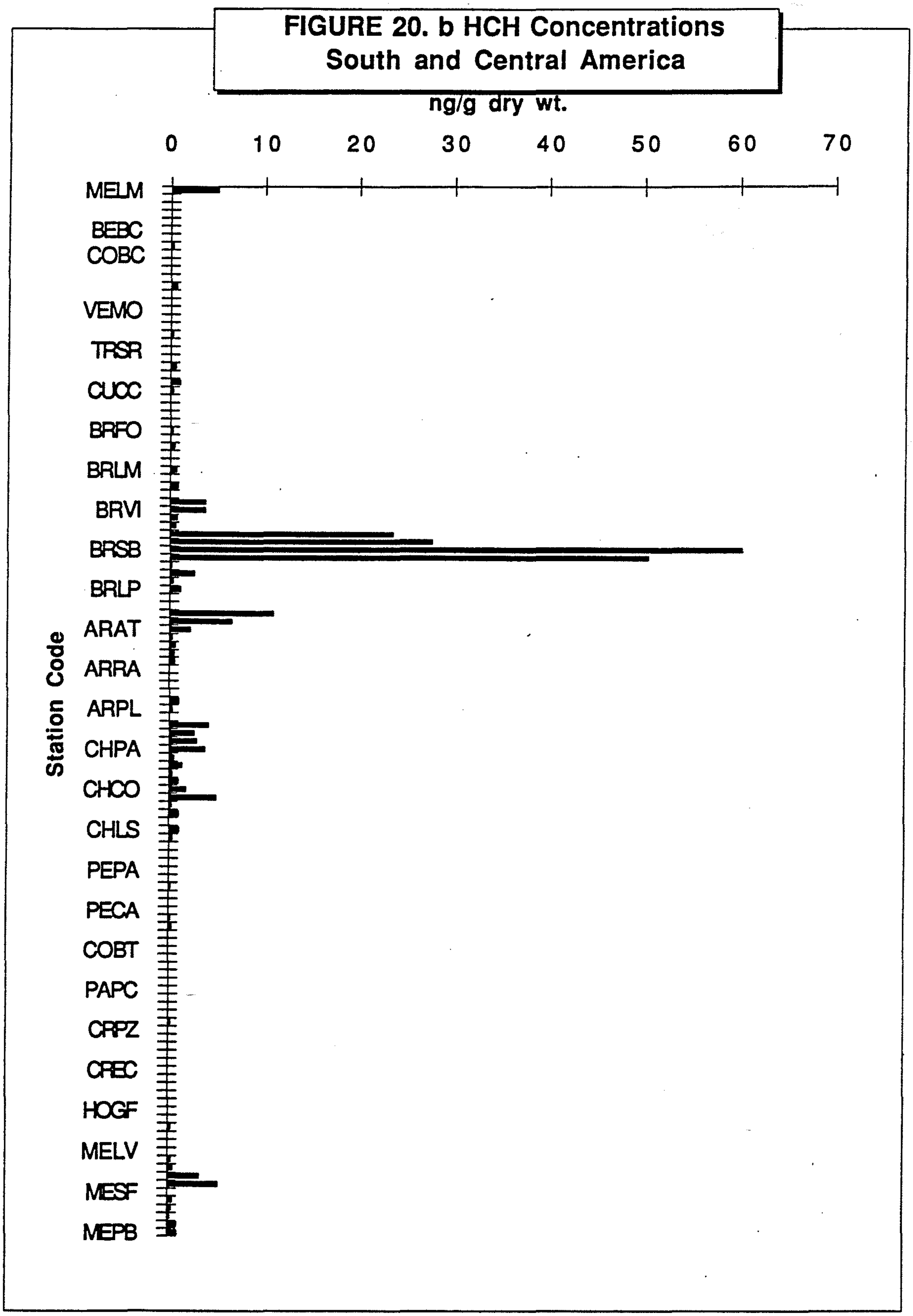


FIGURE 20. b HCH Concentrations
South and Central America
ng/g dry wt.
0
10
20
30
40
50
60
70
Station Code
MELM
BEBC
COBC
VEMO
TRSR
CUCC
BRFO
BRLM
BRVI
BRSB
BRLP
ARAT
ARRA
ARPL
CHPA
CHCO
CHLS
PEPA
PECA
COBT
PAPC
CRPZ
CREC
HOGF
MELV
MESF
MEPB

FIGURE 21. b HCH Concentrations
NOAA S&T Gulf of Mexico, 1991-92

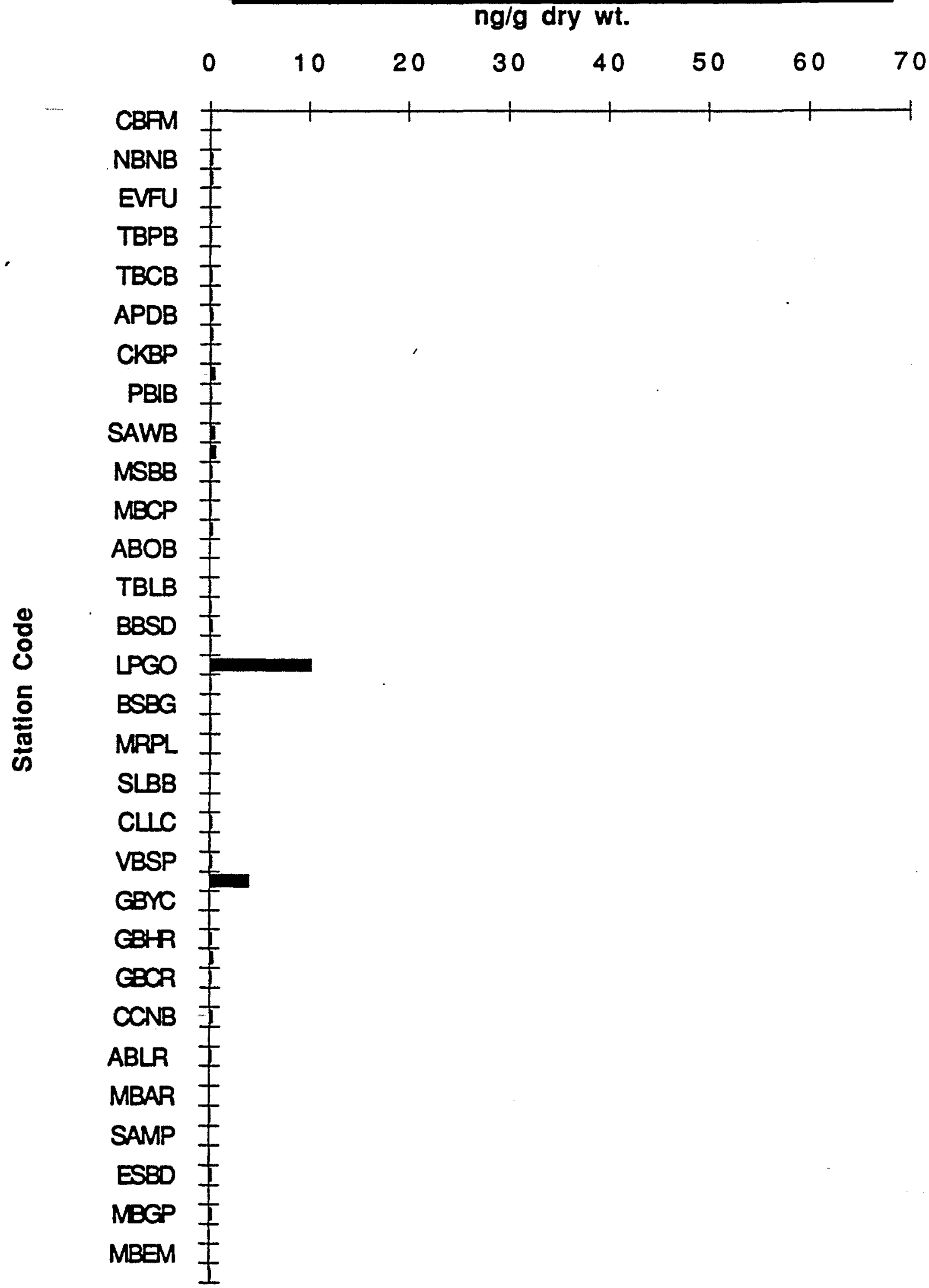


FIGURE 22. Lindane Concentration
South and Central America

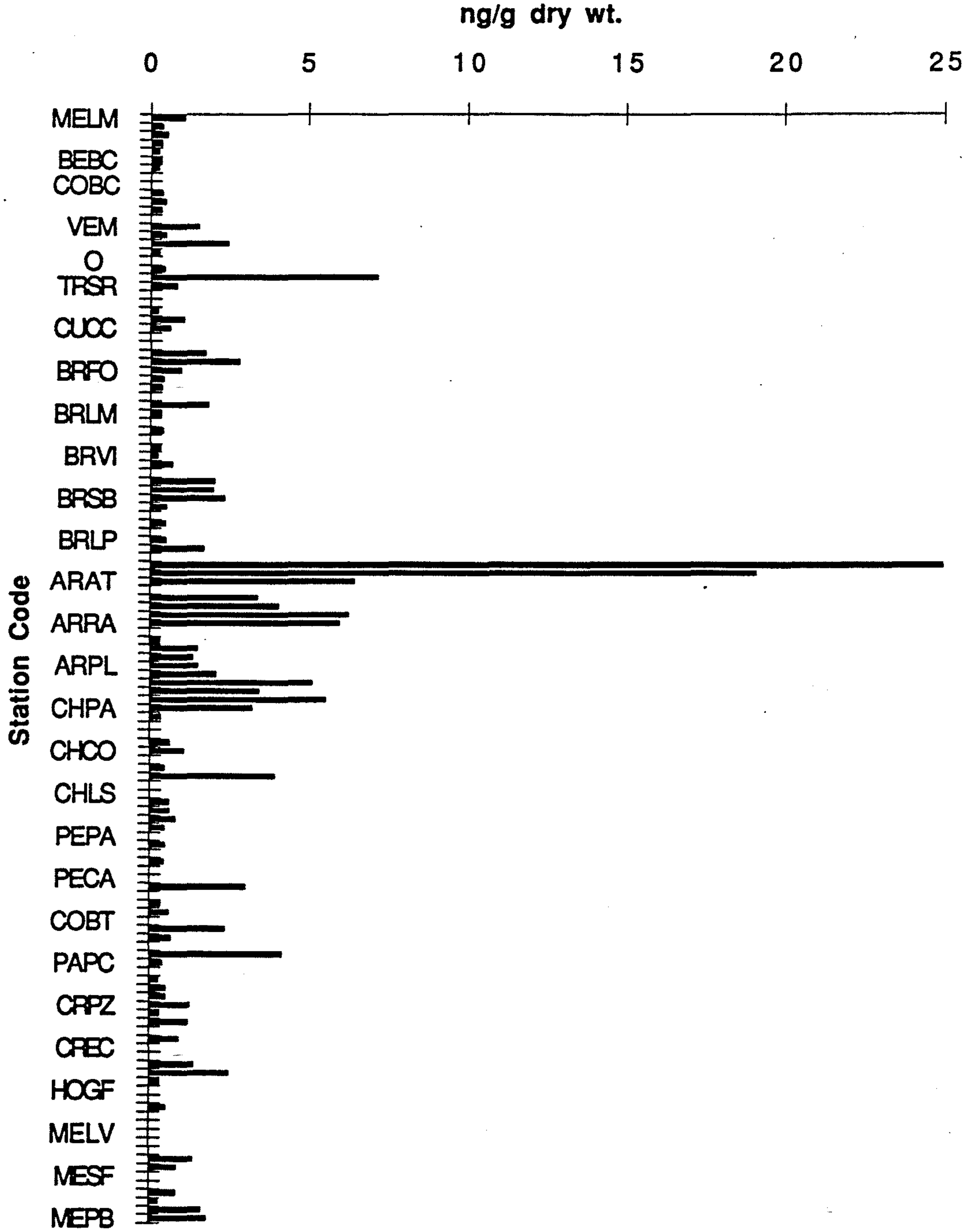


FIGURE 23. Lindane Concentration
NOAA S&T Gulf of Mexico, 1991-92

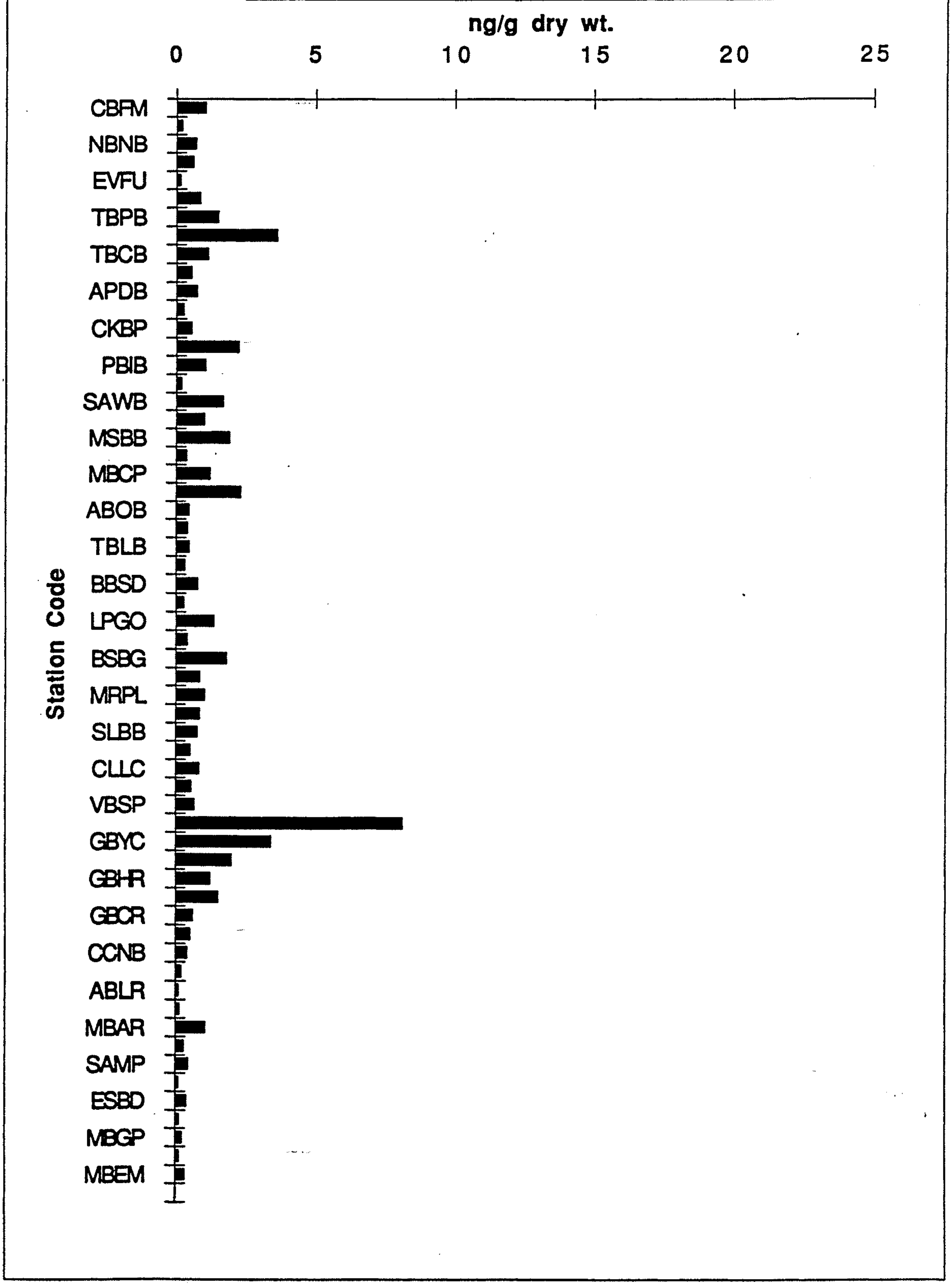


FIGURE 24. Gamma Chlorane Concentration
South and Central America

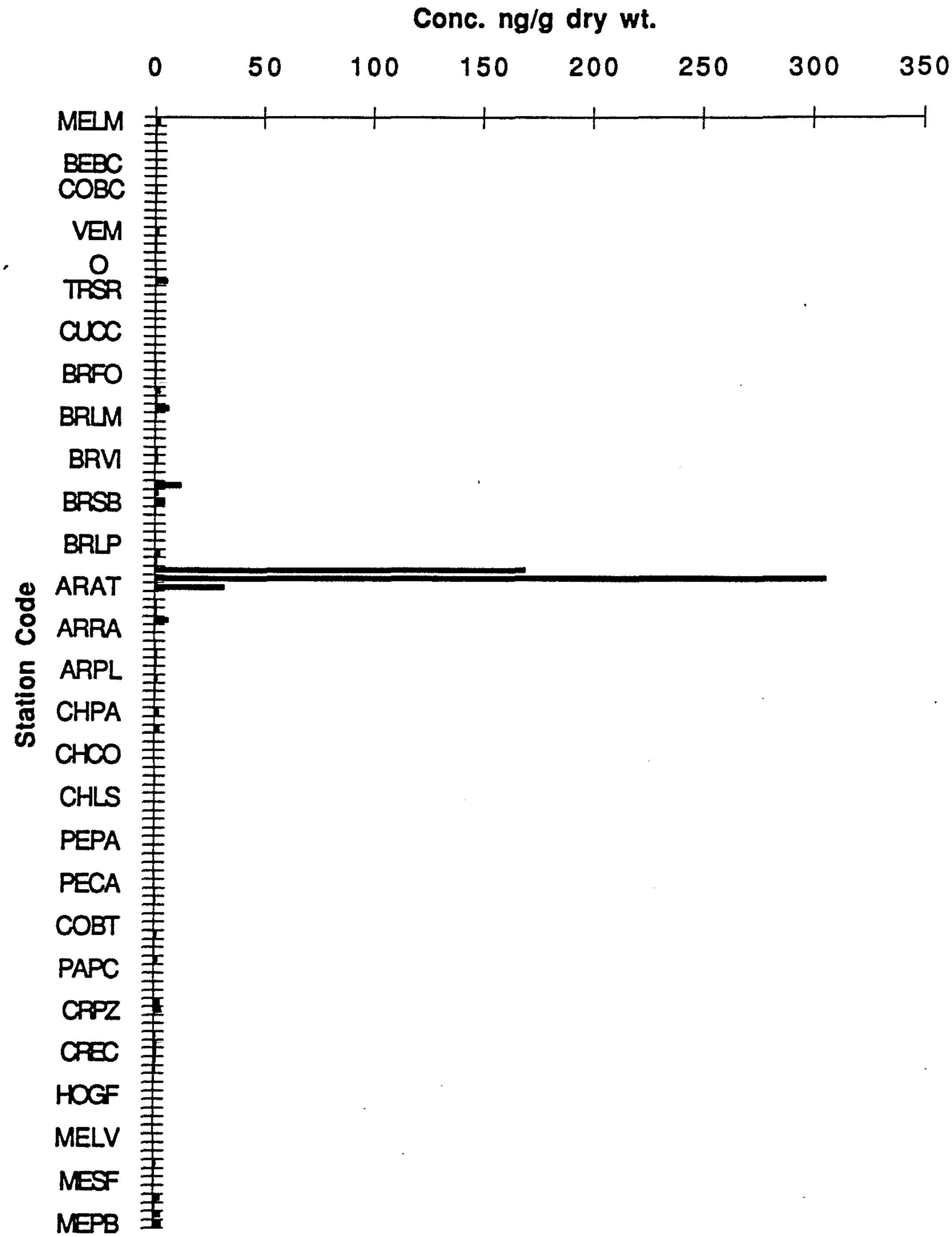


FIGURE 25. CB 138 Concentration South and Central America

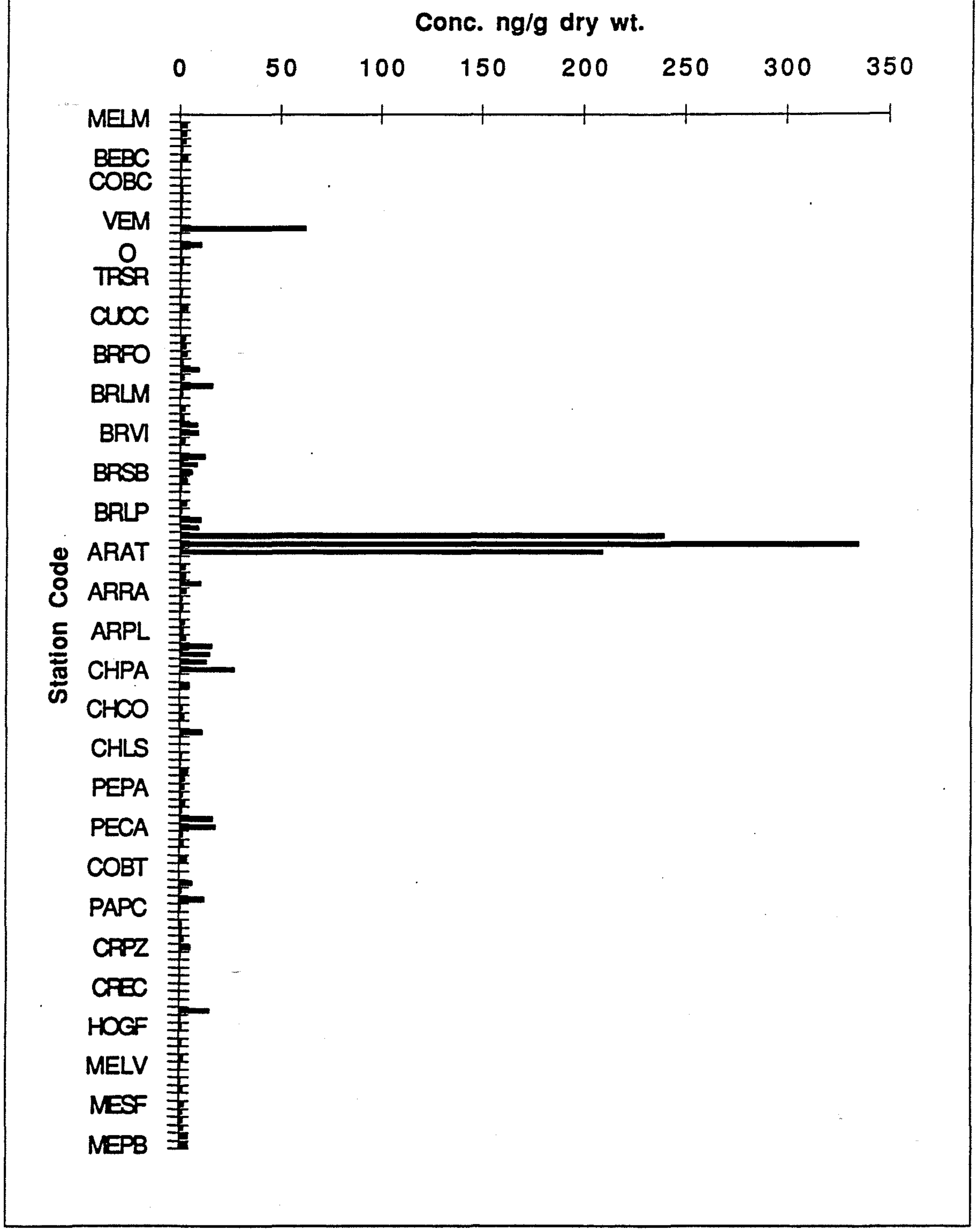
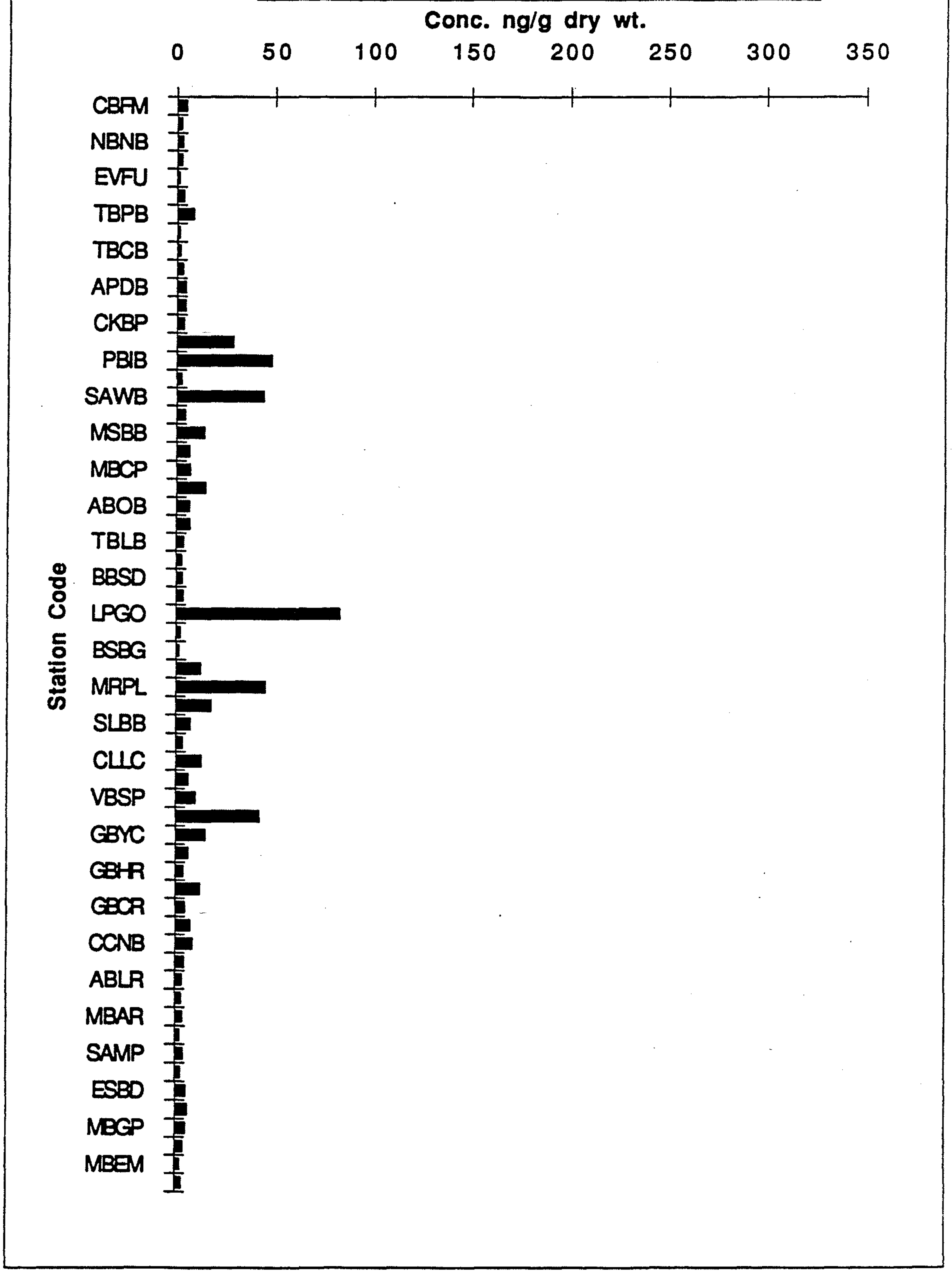


FIGURE 26. CB 138 Concentration
NOAA S&T Gulf of Mexico, 1991-92



found in the NOAA S&T data and the IMW data. Possibly this reflects similar overall use and/or release of PCBs in the IMW Phase I region, but this hypotheses cannot be tested unless adequate production and use data becomes available.

OVERVIEW OF CHLORINATED PESTICIDE AND PCB DATA

Many of the analyte tissue concentrations are at, or below, detection limits. This is good news from an environmental quality perspective. There are no samples for which contaminant concentrations exceed the various national and international recommended action limits for these individual chemicals in seafood destined for human consumption. This does not address the issue of the long term effects of exposure at low concentrations of these chemicals (Colborn et al, 1993; Sheehan et al, 1984; Slorach and Vaz, 1983).

We must keep in mind that the IMW Project was designed to provide a broad geographic assessment only, and at only one point in time. We suspect that concentrations of most of the chlorinated pesticides and chlorobiphenyls are on a curve of decreasing concentrations over time; perhaps similar to that experienced in the United States in the mid-to-northern latitudes of the Western Hemisphere (O'Connor, 1991). However, we cannot be certain until some measures of a time series, either through continuation of a time series of IMW stations and analyses in the near future, or by judicious selection and analyses of sediment cores in key locations, provides definitive proof.

Local areas of intense pollution of major consequence may not have been detected. The original sampling plan was intended to survey coastal contamination from the range of human land uses and was not designed to detect "hot spots". This initial survey should be followed by a more detailed assessment of specific embayments by participating Host-Country scientists and colleagues in their countries using similar techniques. In addition, the stations identified in the IMW data set as having significantly elevated concentrations of chlorinated pesticides or chlorobiphenyl congeners do require further investigation at the regional and local level into the reason for these elevated concentrations in order to provide effective protection of valuable living natural resources and to minimize future threats to public health.

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHS)

Although funding constraints for the Initial Implementation Phase restricted chemical analysis to the chlorinated biocides, scientific and environmental issues of interest in fossil fuel hydrocarbons persist. As part of GERG's routine screening methodology for trace organic contaminants in environmental samples (and with no contractual commitment or funding from the International Mussel Watch Program) concentrations of several PAHs (Table 15) were determined

TABLE 15: Polynuclear Aromatic Hydrocarbons analyzed by GERG on Selected IMW Bivalve Samples

Naphthalene (*)	DBT
C1-Naphthalenes	C1-DBT
C2-Naphthalenes	C2-DBT
C3-Naphthalenes	C3-DBT
1-methyl naphthalene	Fluoranthene (*)
2- methyl naphthalene	Pyrene (*)
2,6-dimethyl naphthalene	C1-Fluoranthene+Pyrene
2,3,5-trimethyl naphthalene	Benz(a)anthracene (*)
Biphenyl (*)	Chrysene (*)
Acenaphthylene	C1-Chrysene
Acenaphthene (*)	C2-Chrysene
Fluorene (*)	C3-Chrysene
C1-Fluorenes	C4-Chrysene
C2-Fluorenes	Benzo(b)fluoranthene
C3-Fluorenes	Benzo(k)fluoranthene
Phenanthrene (*)	Benzo(e)pyrene (*)
1-methyl phenanthrene (*)	Benzo(a)pyrene (*)
Anthracene (*)	Perylene (*)
C1-Phenanthrene+Anthracene	Indeno[1,2,3-c,d]pyrene
C2-Phenanthrene+Anthracene	Dibenz(a,h)anthracene (*)
C3-Phenanthrene+Anthracene	Benzo(g,h,i)perylene
C4-Phenanthrene+Anthracene	

(*) An asterisk indicates the PAHs analyzed for the first year of the US NOAA National Status and Trends Program in bivalve samples collected for the IMW Program that were previously analyzed for chlorinated hydrocarbons. The following is a brief overview of the PAH data provided by GERG. These preliminary data provide information on the PAH concentrations in Central and South America, including Mexico, and the Caribbean region.

The preliminary total concentrations found in samples from 56 locations in the Caribbean region, Central and South America, including Mexico, is summarized in Table 16. Total concentrations are presented as the uncensored sum of 18 specific PAHs measured for NOAA's Status and Trends Mussel Watch Program in the U.S.A. (S&T PAHs) and as the uncensored sum of all the PAHs listed in Table 15 (tPAHs). The geographical distribution for total S&T PAHs and tPAHs are provided in Figures 27 and 28, respectively. In these figures the concentrations are shown in a north-to-south geographical sequence from the U.S.A.-Mexico border down along the east and west coasts to the most southern sites in Chile and Argentina, respectively. Examples of S&T PAH profile distribution encountered in samples from different locations are shown in Figure 29.

Total concentrations of S&T PAHs and tPAHs ranged from 20 to 1,670 ng/g dry weight and from 28 to 13,800 ng/g dry weight, respectively. In general the highest concentrations in both groups were encountered in sites located near Navy/commercial ports and/or large urban centers. The high concentrations encountered in samples from stations ARHU and ARAP in Argentina, BRRE and BRGB in Brazil, CHPA and CHCO in Chile and MEEM in Mexico are examples of the influence of these sources of PAHs. The lowest concentrations were in contrast, found in areas with low population and/or minimal transportation activities using fossil fuel.

The different molecular distribution for individual S&T PAHs shown in Figure 29 illustrates the differences in hydrocarbon sources encountered during this study. In most samples, the ratios of 4+5-ring to 2+3-ring PAHs were lower than 1. The predominance of the methyl and dimethyl naphthalenes is indicative of petroleum inputs. This is consistent with the dominance of substituted homologs over their unsubstituted parent compounds observed in most of the samples analyzed and roughly indicated by the methyl phenanthrene-to-phenanthrene ratios in Figure 29 (Sericano, personal communication). Petroleum, however, is not the only source of PAHs in the samples as indicated by some of the diagnostic ratios useful in determining PAH sources. For example the ratios of phenanthrene to anthracene (range =<1.0 to 29) indicate the contribution of combustion products to total PAH concentrations in some of the samples.

These data show a wide range of concentrations of PAHs in the bivalve tissue samples derived from petroleum and combustion sources. Concentrations of PAH appear to be similar both in range of concentration and in proportion of samples with specific concentration distributions, to PAH concentrations in bivalve samples from the U.S. coast reported by the U.S. National Status and Trends program (NOAA, 1989).

TABLE 16: Polynuclear Aromatic Hydrocarbon Concentrations (reported as ng/g, dry wt.) and Distribution Frequencies in International Mussel Watch Samples

	S&T PAHs	Total PAHs
Average	182	1340
Median	79.3	290
Range	20.0-1670	28.4-13800
Distribution (%)		
<20.0 ng g^{-1}	2	
20.0 - <100 ng g^{-1}	60	14
100 - <1000 ng g^{-1}	36	61
1000 - <10000 ng g^{-1}	2	23
≥10000 ng g^{-1}		

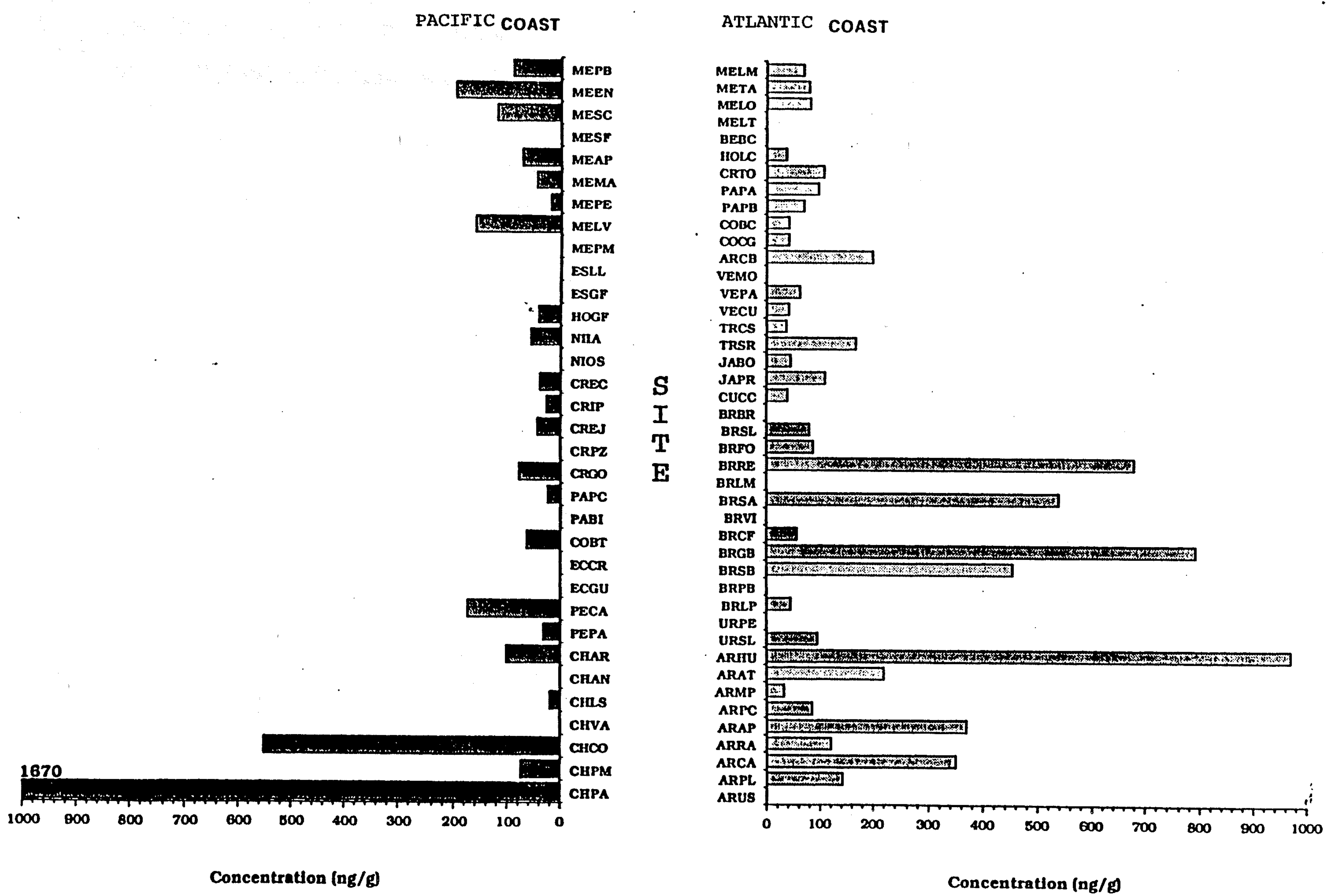


FIGURE 27: S&T PAHs

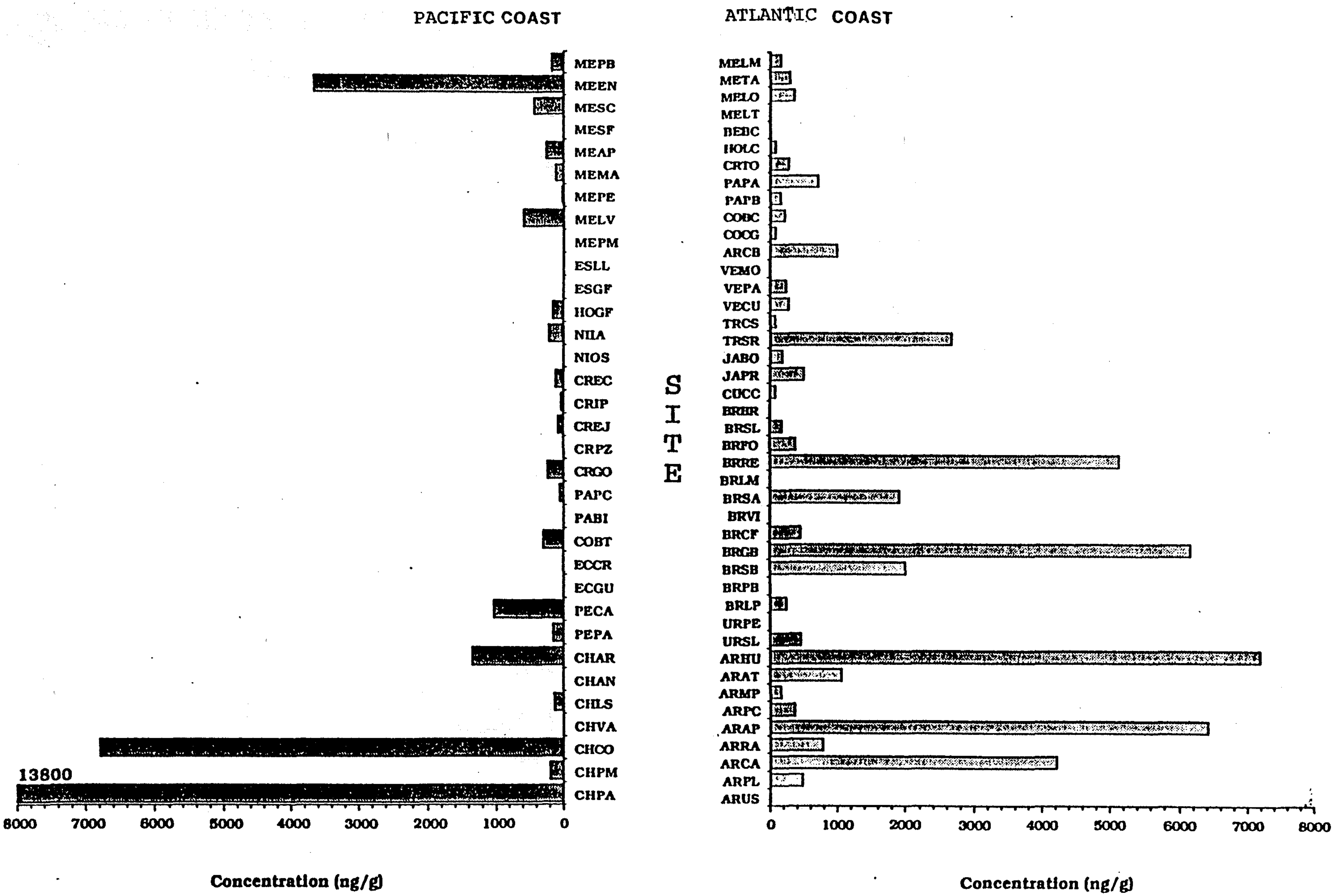


FIGURE 28: Total PAHs

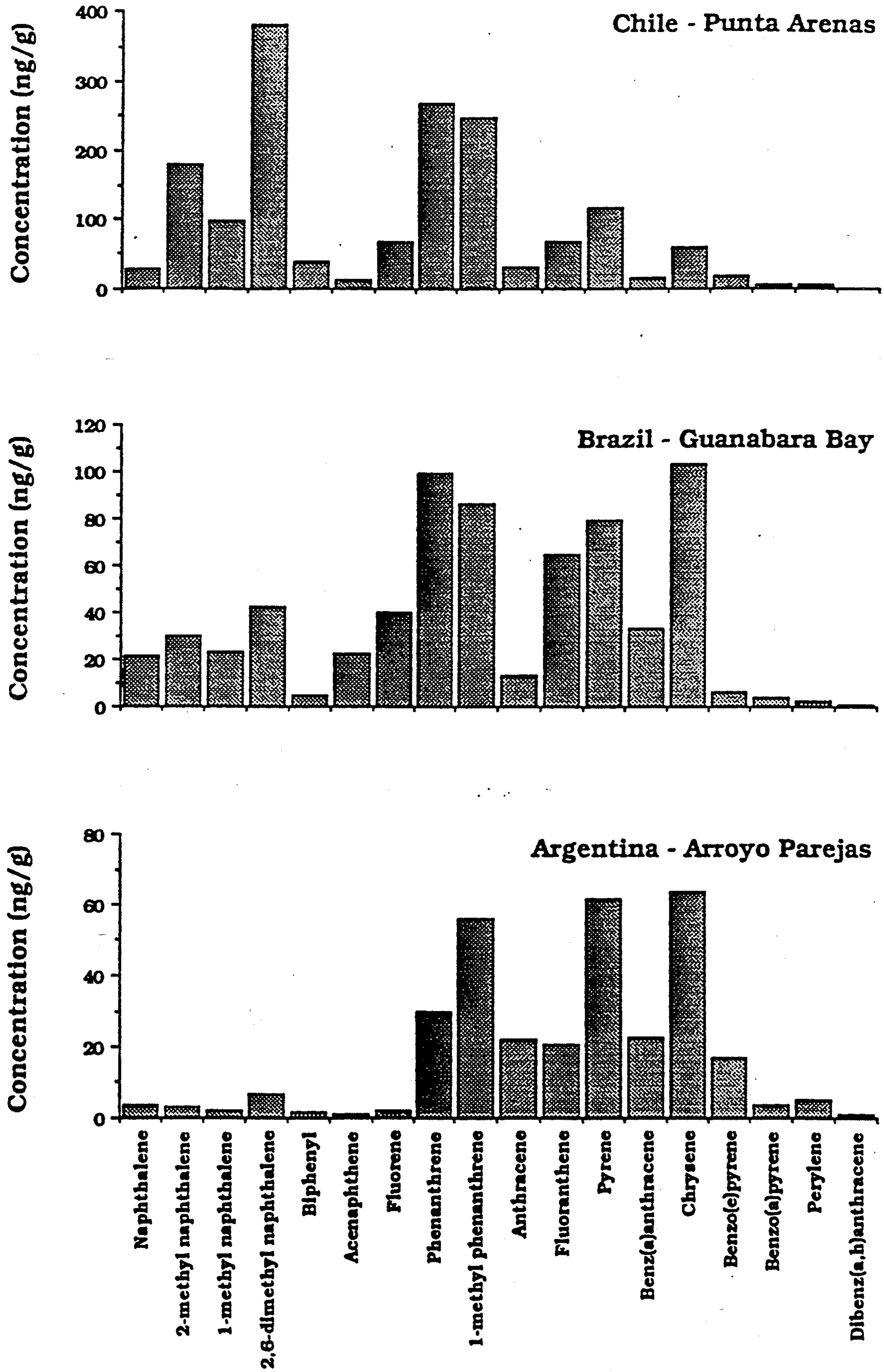


FIGURE 29: Distribution of specific PAH

This brief overview of a more complete PAH data set generated by GERG for the International Mussel Watch Program provides an introduction to an important topic that deserves further discussion by the international community. Contamination of coastal areas by elevated concentrations of PAH is ubiquitous as indicated by the IMW and NOAA S&T data and may threaten the viability of living natural resource populations or even be of human health concern in some locations.

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Appendices

A • Combined IMW Dataset from Central Laboratories, with Inventory of Samples Collected

B • Central Laboratory Analytical Methods

C • Host Country Interlaboratory QA Comparison Exercise

D • Summary of Available Production and Use Data

E • Report of Field Scientist: field sampling program

F • List of Host-Country Scientists

Appendix A

Combined IMW Dataset from Central Laboratories, with Inventory of Samples Collected

The combined IMW database, including all QA/QC data, consists of two reports:

- Collection Sites and Sample Inventory
- Analytical Results of Tissue Concentrations

These two reports represent the complete combined dataset of analytical results from the Initial Implementation Phase of International Mussel Watch. The analytical chemistry data has been reviewed by the two principle analysts, Drs. J. Sericano (GERG) and J. Readman (MEL) and revisions to the database have been made based on their comments.

The Sample Inventory is organized sequentially by Sample ID Number and includes all samples collected during the Initial Implementation Phase in Latin America. The Sample Inventory includes sample Identification Code, country of origin, station site name, species name, number of individual organisms sampled and tissue wet weight in sample jar. A unique four-digit sample number was assigned sequentially to each sample at the time of collection and indicates the chronological sequence in which samples were taken. In some cases, especially in Central America, one country may have been sampled in fragments over multiple sampling trips. Thus the sample number is not a convenient way to identify station location. The parallel four-letter Identification Code is a combination of country name and sample site name (e.g., Brazil/Cabo Frio=BRCF). This Code identifies sampling stations on the map (Fig. A1).

At each sampling station replicate samples (i.e., "A" and "B") were usually taken. In some cases, more than a single replicate set was sampled (e.g., very large embayments, different sediment substrates or if more than a single species was present). All samples were transported to Texas and stored frozen in solvent-rinsed glass jars until analysis. Many samples remain unanalyzed and are archived temporarily at Texas A&M University.

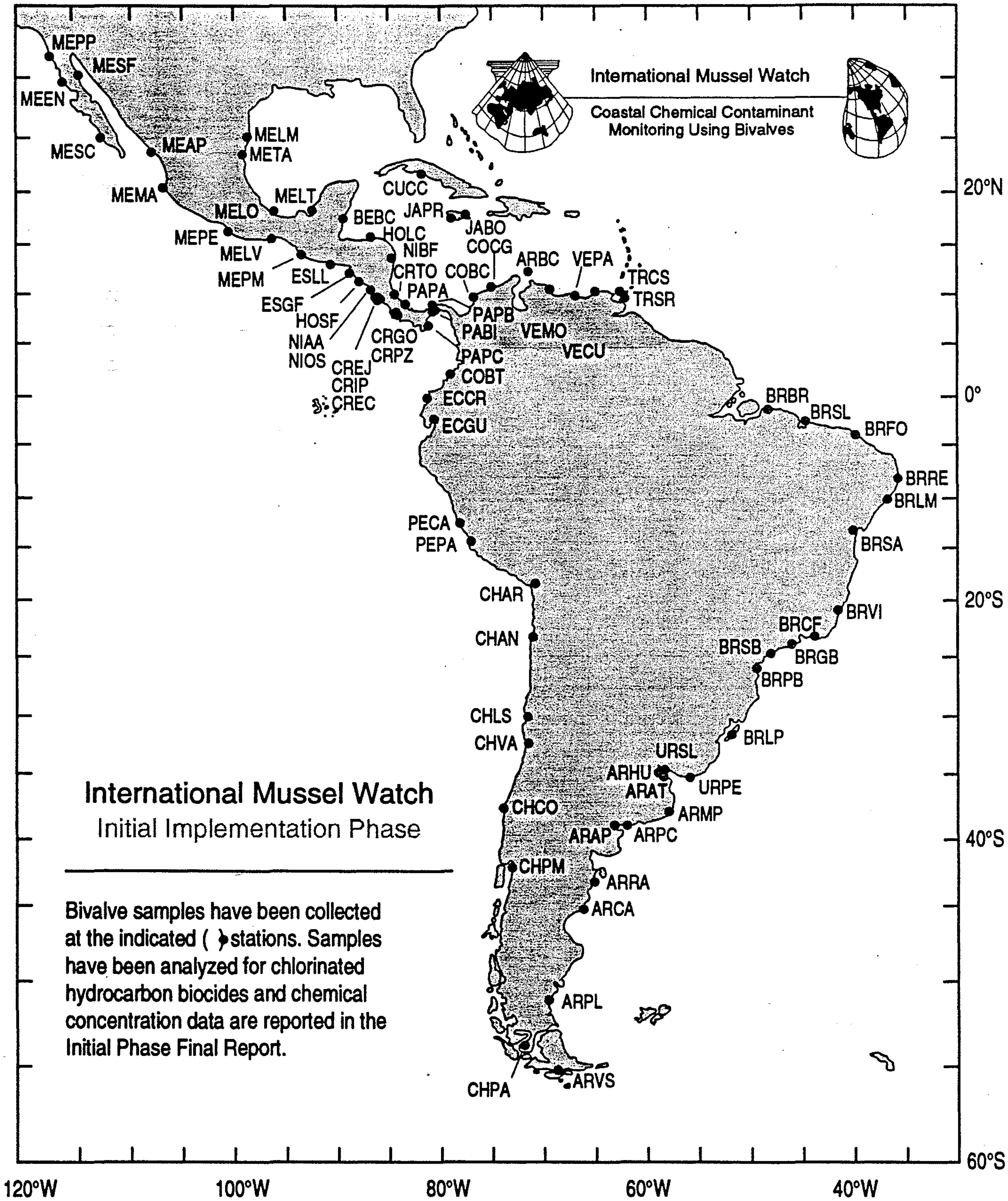
Sample stations in the report of analytical results are indicated in Figure A1 and in this report they are organized geographically, beginning in eastern Mexico (MELM) and following the Central America Caribbean coastline south and east to Trinidad (TRSR) where they loop back north and west to include the Caribbean sampling stations, ending at Cuba (CUCC). No IMW samples were taken in Puerto Rico because the US NOAA Status and Trends program includes that island. After Cuba, the sample sequence returns to continental South America in northern Brazil (BRBR) and continues southerly, following the Atlantic coastline southward to Tierra del Fuego (ARVS). From there, sample stations are ordered from south-to-north along the South America Pacific coast to western Mexico and the US border.

Chlorinated hydrocarbon concentrations in bivalve tisses are reported as ng/gdw and have been corrected for recoveries by the individual Analytical Center. For this report , we have adopted a reporting limit of 250pg/g for each analyte in the combined dataset (see the discussion in the QA/QC section of the report) and have indicated in the data tables any concentration below that as "trace" (Tr) unless it was reported by the Analytical Center as below detection limits (i.e., not detected, N.D.). Data reported by participating Host-Country analysts is not included here but are discussed in Appendix C.

In addition to the analytical results, the International Mussel Watch database contains information on:

- participating Host-Country scientists (e.g., name, address, fax, etc.)
- bivalve species (e.g., scientific and common names, length, range, etc.)
- sample site description (e.g., collector observations, location information, etc.)
- sample file (e.g., sample handling, storage, etc.)

The software for this complex database is 4th Dimension, a relational database tool which runs on Macintosh. The database structure was designed by the Project Secretariat staff to meet IMW data needs.


International Mussel Watch
Coastal Chemical Contaminant Monitoring Using Bivalves
International Mussel Watch
Initial Implementation Phase
Bivalve samples have been collected at the indicated ( ) stations. Samples have been analyzed for chlorinated hydrocarbon biocides and chemical concentration data are reported in the Initial Phase Final Report.
MEPP
MESF
MEEN
MESC
MEAP
MELM
META
MEMA
MELO
MELT
CUCC
BEBC
JAPR
JABO
COCG
HOLC
MEPE
MELV
NIBF
MEPM
ESLL
CRTO
COBC
ARBC
VEPA
TRCS
TRSR
PAPA
ESGF
HOSF
NIAA
NIOS
CRGO
CRPZ
PAPB
PABI
VEMO
VECU
PAPC
CREJ
CRIP
CREC
COBT
ECCR
ECGU
BRBR
BRSL
BRFO
BRRE
BRLM
PECA
PEPA
BRSA
CHAR
BRVI
BRCF
CHAN
BRSB
BRGB
BRPB
CHLS
CHVA
BRLP
URSL
ARHU
ARAT
URPE
CHCO
ARMP
ARAP
ARPC
CHPM
ARRA
ARCA
ARPL
ARVS
CHPA
20°N
0°
20°S
40°S
60°S
120°W
100°W
80°W
60°W
40°W

IMW SAMPLE INVENTORY INITIAL IMPLEMENTATION PHASE

Smpl ID	Code	Cho lera	Country	Location	Bivalve	n	wet wt.	Status
0	GUPB	XX	GUATEMALA	Puerto Barrios		0	0	
1001	ARHU	1A	ARGENTINA	Hudson	*Corbicula fluminea*	40	180	ARCHIVE/JANIOT
1002	ARHU	1B	ARGENTINA	Hudson	*Corbicula fluminea*	40	170	ILMR/JANIOT
1003	ARHU	2A	ARGENTINA	Hudson	*Corbicula fluminea*	40	180	ARCHIVE/JANIOT
1004	ARHU	2B	ARGENTINA	Hudson	*Corbicula fluminea*	40	190	GERG/JANIOT
1005	ARHU	3A	ARGENTINA	Hudson	*Corbicula fluminea*	40	180	ARCHIVE/JANIOT
1006	ARHU	3B	ARGENTINA	Hudson	*Corbicula fluminea*	40	170	ARCHIVE/JANIOT
1007	ARAT	1A	ARGENTINA	Atalaya	*Corbicula fluminea*	40	180	ARCHIVE/JANIOT
1008	ARAT	1B	ARGENTINA	Atalaya	*Corbicula fluminea*	40	170	GERG/JANIOT
1009	ARAT	2A	ARGENTINA	Atalaya	*Corbicula fluminea*	40	190	ARCHIVE/JANIOT
1010	ARAT	2B	ARGENTINA	Atalaya	*Corbicula fluminea*	40	160	ARCHIVE/JANIOT
1011	ARAT	3A	ARGENTINA	Atalaya	*Corbicula fluminea*	40	190	ARCHIVE/JANIOT
1012	ARAT	3B	ARGENTINA	Atalaya	*Corbicula fluminea*	40	180	ARCHIVE/JANIOT
1013	URPE	1A	URUGUAY	Punta del Este	*Mytilus platensis*	45	190	ARCHIVE
1014	URPE	1B	URUGUAY	Punta del Este	*Mytilus platensis*	45	190	ILMR
1015	URPE	2A	URUGUAY	Punta del Este	*Mytilus platensis*	50	180	ARCHIVE
1016	URPE	2B	URUGUAY	Punta del Este	*Mytilus platensis*	50	170	ARCHIVE
1017	URPE	3A	URUGUAY	Punta del Este	*Mytilus platensis*	50	180	ARCHIVE
1018	URPE	3B	URUGUAY	Punta del Este	*Mytilus platensis*	50	180	ARCHIVE
1019	URSL	1A	URUGUAY	Santa Lucia	*Corbicula fluminea*	100	140	ARCHIVE/ALTAMIRANO
1020	URSL	1B	URUGUAY	Santa Lucia	*Corbicula fluminea*	100	130	GERG/ALTAMIRANO
1021	ARMP	1A	ARGENTINA	Mar del Plata	*Mytilus platensis*	15	190	ARCHIVE
1022	ARMP	1B	ARGENTINA	Mar del Plata	*Mytilus platensis*	15	200	ARCHIVE
1023	ARMP	2A	ARGENTINA	Mar del Plata	*Mytilus platensis*	15	180	ARCHIVE
1024	ARMP	2B	ARGENTINA	Mar del Plata	*Mytilus platensis*	15	140	GERG
1025	ARMP	3A	ARGENTINA	Mar del Plata	*Mytilus platensis*	15	130	ARCHIVE
1026	ARMP	3B	ARGENTINA	Mar del Plata	*Mytilus platensis*	15	110	ARCHIVE

IMW SAMPLE INVENTORY INITIAL IMPLEMENTATION PHASE

Smpl ID	Code	Cholera	Country	Location	Bivalve	n	wet wt.	Status
1027A	ARPC	1A	ARGENTINA	Pehuen-co	*Bracchidonies rodrigezii*	100	160	GERG
1027B	ARPC	1A	ARGENTINA	Pehuen-co	*Bracchidonies rodrigezii*	100	160	GERG
1027S	APRC	1A	ARGENTINA	Pehuen-co	*Bracchidonies rodrigezii*	100	160	GERG
1028	ARPC	1B	ARGENTINA	Pehuen-co	*Bracchidonies rodrigezii*	100	150	ARCHIVE
1029	ARAP	1A	ARGENTINA	Arroyo Parejas	*Bracchidonies rodrigezii*	100	170	GERG
1030	ARAP	1B	ARGENTINA	Arroyo Parejas	*Bracchidonies rodrigezii*	100	180	ARCHIVE
1031	ARRA	1A	ARGENTINA	Rawson	*Mytilus platensis*	50	160	ARCHIVE/ESTEVES
1032	no sample					0	0	
1033	ARRA	2A	ARGENTINA	Rawson	*Mytilus platensis*	50	170	GERG/ESTEVES
1034	no sample					0	0	
1035	ARRA	3A	ARGENTINA	Rawson	*Mytilus platensis*	50	100	ARCHIVE/ESTEVES
1036	no sample					0	0	
1037	ARCA	1A	ARGENTINA	Bahia Camarones	*Aulacomya ater*	30	130	GERG/ESTEVES
1038	ARCA	1B	ARGENTINA	Bahia Camarones	*Aulacomya ater*	30	120	ARCHIVE/ESTEVES
1039	ARCA	2A	ARGENTINA	Bahia Camarones	*Aulacomya ater*	30	100	ARCHIVE/ESTEVES
1040	ARCA	2B	ARGENTINA	Bahia Camarones	*Aulacomya ater*	30	130	GERG/ESTEVES
1041	ARCA	3A	ARGENTINA	Bahia Camarones	*Aulacomya ater*	30	160	ARCHIVE/ESTEVES
1042	ARCA	3B	ARGENTINA	Bahia Camarones	*Aulacomya ater*	30	140	ILMR/ESTEVES
1043	ARCA	1	ARGENTINA	Bahia Camarones	*Mytilus platensis*	30	130	GERG/ESTEVES
1044	no sample					0	0	
1045	ARUS	1A	ARGENTINA	Ushuaia	*Mytilus edulis chilensis*	25	170	ARCHIVE
1046	ARUS	1B	ARGENTINA	Ushuaia	*Mytilus edulis chilensis*	25	170	ILMR
1047	ARUS	2A	ARGENTINA	Ushuaia	*Mytilus edulis chilensis*	25	160	ARCHIVE
1048	ARUS	2B	ARGENTINA	Ushuaia	*Mytilus edulis chilensis*	25	170	ARCHIVE

IMW SAMPLE INVENTORY INITIAL IMPLEMENTATION PHASE

Smpl ID	Code		Cholera	Country	Location	Bivalve	n	wet wt.	Status
1049	ARUS	3A		ARGENTINA	Ushuaia	*Mytilus edulis chilensis*	25	200	ARCHIVE
1050	ARUS	3A		ARGENTINA	Ushuaia	*Mytilus edulis chilensis*	25	200	ARCHIVE
1051	ARPL	1A		ARGENTINA	Punta Loyola	*Mytilus platensis*	25	180	ARCHIVE
1052	ARPL	1B		ARGENTINA	Punta Loyola	*Mytilus platensis*	25	170	GERG
1053	ARPL	2A		ARGENTINA	Punta Loyola	*Mytilus platensis*	25	180	ARCHIVE
1054	no sample						0	0	
1055	ARPL	3A		ARGENTINA	Punta Loyola	*Mytilus platensis*	25	180	ARCHIVE
1056	no sample						0	0	
1057	PAPB	1A		PANAMA	Portobelo	*Isognomon alatus*	100	120	GERG/DUKE
1058	PAPB	1B		PANAMA	Portobelo	*Isognomon alatus*	100	140	ARCHIVE/DUKE
1059	PABI	1A		PANAMA	Playa Bique	*Mytilus edulis*	25	160	ARCHIVE/DUKE
1060	PABI	1B		PANAMA	Playa Bique	*Mytilus edulis*	25	150	ILMR/DUKE
1061	PABI	2A		PANAMA	Playa Bique	*Mytilus edulis*	25	170	ARCHIVE/DUKE
1062	PABI	2B		PANAMA	Playa Bique	*Mytilus edulis*	25	160	ARCHIVE/DUKE
1063	PAPC	1A		PANAMA	Punta Chame	*Anadara tuberculosa*	10	160	ARCHIVE/DUKE
1064	PAPC	1B		PANAMA	Punta Chame	*Anadara tuberculosa*	10	180	GERG/DUKE
1065	NIIA	1A		NICARAGUA	Isla de Aserradores	*Anadara tuberculosa*	16	180	ARCHIVE/LACAYO
1066	NIIA	1B		NICARAGUA	Isla de Aserradores	*Anadara tuberculosa*	16	150	GERG/LACAYO
1067	NIIA	2A		NICARAGUA	Isla de Aserradores	*Anadara tuberculosa*	16	170	ARCHIVE/LACAYO
1068	NIIA	2B		NICARAGUA	Isla de Aserradores	*Anadara tuberculosa*	16	160	ARCHIVE/LACAYO
1069	NIOS	1A		NICARAGUA	Ostional	*Protothaca grata*	70	170	ARCHIVE/LACAYO
1070	NIOS	1B		NICARAGUA	Ostional	*Protothaca grata*	70	170	ILMR/LACAYO
1071	CREJ	1A		COSTA RICA	Estero Jicaral	*Anadara tuberculosa*	10	150	ARCHIVE/BRENES/GONZA
1072	CREJ	1B		COSTA RICA	Estero Jicaral	*Anadara tuberculosa*	10	130	GERG/BRENES/GONZA
1073	CREJ	1C		COSTA RICA	Estero Jicaral	*Protothaca grata*	30	190	ARCHIVE/BRENES/GONZA

IMW SAMPLE INVENTORY INITIAL IMPLEMENTATION PHASE

Smpl ID	Code		Cho lera	Country	Location	Bivalve	n	wet wt.	Status
1074	CREJ	1D		COSTA RICA	Estero Jicaral	*Protothaca grata*	30	210	ARCHIVE/BRENES/GONZA
1075	CRIP	1A		COSTA RICA	Isla Paloma	*Anadara gradis*	7	170	GERG/BRENES/GONZA
1076	CRIP	1B		COSTA RICA	Isla Paloma	*Anadara gradis*	7	180	ARCHIVE/BRENES/GONZA
1077	CREC	1A		COSTA RICA	Estero Cocoroca	*Anadara tuberculosa*	20	200	GERG/BRENES/GONZA
1078	CREC	1B		COSTA RICA	Estero Cocoroca	*Anadara tuberculosa*	20	200	ILMR/BRENES/GONZA
1079A	CREC	1C		COSTA RICA	Estero Cocoroca	*Anadara similis*	20	230	GERG/BRENES/GONZA
1079B	CREC	1C		COSTA RICA	Estero Cocoroca	*Anadara similis*	20	230	GERG/BRENES/GONZA
1080	CREC	1D		COSTA RICA	Estero Cocoroca	*Anadara similis*	20	210	ARCHIVE/BRENES/GONZA
1081	CRGO	1A		COSTA RICA	Golfito	*Anadara tuberculosa*	20	140	ARCHIVE/GONZALEZ
1082	CRGO	1B		COSTA RICA	Golfito	*Anadara tuberculosa*	20	130	GERG/GONZALEZ
1083A	CRGO	1C		COSTA RICA	Golfito	*Anadara similis*	20	160	GERG/GONZALEZ
1083B	CRGO	1C		COSTA RICA	Golfito	*Anadara similis*	20	160	GERG/GONZALEZ
1083S	CRGO	1C		COSTA RICA	Golfito	*Anadara similis*	20	160	GERG/GONZALEZ
1084	no sample						0	0	
1085	CRGO	1E		COSTA RICA	Golfito	*Protothaca grata*	15	110	GERG/GONZALEZ
1086	no sample						0	0	
1087	CRGO	2A		COSTA RICA	Golfito	*Anadara tuberculosa*	12	190	ARCHIVE/GONZALEZ
1088	CRGO	2B		COSTA RICA	Golfito	*Anadara tuberculosa*	12	190	ARCHIVE/GONZALEZ
1089	CRPZ	1A		COSTA RICA	Punta Zancudo	*Anadara tuberculosa*	10	200	ARCHIVE/GONZALEZ
1090	CRPZ	1B		COSTA RICA	Punta Zancudo	*Anadara tuberculosa*	10	200	ILMR/GONZALEZ
1091	PAPA	1A	C	PANAMA	Puerto Almirante	*Ctenoidies scabra*	12	190	ARCHIVE/DUKE
1092	PAPA	1B	C	PANAMA	Puerto Almirante	*Ctenoidies scabra*	12	180	GERG/DUKE
1093	PAPA	2A	C	PANAMA	Puerto Almirante	*Ctenoidies scabra*	12	190	ARCHIVE/DUKE
1094	PAPA	2B	C	PANAMA	Puerto Almirante	*Ctenoidies scabra*	12	200	ARCHIVE/DUKE
1095	COBC	1A	C	COLOMBIA	Bahia de Cartagena	*Crassostrea rizhoph.*	50	120	ARCHIVE/GARAY

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Smpl ID	Code		Cholera	Country	Location	Bivalve	n	wet wt.	Status
1096	COBC	1B	C	COLOMBIA	Bahia de Cartagena	*Crassostrea rizhoph.*	50	120	GERG/GARAY
1097	COBC	2A	C	COLOMBIA	Bahia de Cartagena	*Crassostrea rizhoph.*	50	160	ARCHIVE/GARAY
1098	COBC	2B	C	COLOMBIA	Bahia de Cartagena	*Crassostrea rizhoph.*	50	160	GERG/GARAY
1099	COCG	1A		COLOMBIA	Cienaga Grande	*Crassostrea virginica*	15	160	ARCHIVE
1100	COCG	1B		COLOMBIA	Cienaga Grande	*Crassostrea virginica*	15	150	GERG
1101	COCG	2A		COLOMBIA	Cienaga Grande	*Crassostrea virginica*	15	160	ARCHIVE
1102	COCG	2B		COLOMBIA	Cienaga Grande	*Crassostrea virginica*	15	170	ILMR
1103	COCG	3A		COLOMBIA	Cienaga Grande	*Crassostrea rizhophorae*	15	160	ARCHIVE
1104	COCG	3B		COLOMBIA	Cienaga Grande	*Crassostrea rizhophorae*	15	160	ARCHIVE
1105	COBT	1A	C	COLOMBIA	Bahia Tumaco	*Anadara tuberculosa*	15	130	ARCHIVE/PALACIO/GOME
1106	no sample		C				0	0	
1107	COBT	1C	C	COLOMBIA	Bahia Tumaco	*Anadara similis*	15	110	GERG/PALACIO/GOME
1108	no sample		C				0	0	
1109	COBT	2A	C	COLOMBIA	Bahia Tumaco	*Anadara tuberculosa*	15	150	ARCHIVE/PALACIO/GOME
1110	COBT	2B	C	COLOMBIA	Bahia Tumaco	*Anadara tuberculosa*	15	160	ILMR/PALACIO/GOME
1111	COBT	3A	C	COLOMBIA	Bahia Tumaco	*Anadara tuberculosa*	15	200	GERG/PALACIO/GOME
1112	no sample		C				0	0	
1113	COBT	3C	C	COLOMBIA	Bahia Tumaco	*Anadara similis*	15	130	GERG/PALACIO/GOME
1114	no sample		C				0	0	
1115	VEPA	1A		VENEZUELA	Paparo	*Tivela mactroides*	60	160	ARCHIVE/JAFFE
1116	VEPA	1B		VENEZUELA	Paparo	*Tivela mactroides*	60	180	GERG/JAFFE
1117	VEPA	2A		VENEZUELA	Paparo	*Tivela mactroides*	60	170	ARCHIVE/JAFFE

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Smpl ID	Code	Cholera	Country	Location	Bivalve	n	wet wt.	Status
1118	VEPA 2B		VENEZUELA	Paparo	*Tivela mactroides*	60	190	ARCHIVE/JAFFE
1119	VEPA 3A		VENEZUELA	Paparo	*Tivela mactroides*	60	160	ARCHIVE/JAFFE
1120	VEPA 3B		VENEZUELA	Paparo	*Tivela mactroides*	60	160	ARCHIVE/JAFFE
1121	VEMO 1A		VENEZUELA	Morrocoy	*Isognomon alatus*	75	150	ARCHIVE
1122	VEMO 1B		VENEZUELA	Morrocoy	*Isognomon alatus*	75	170	ILMR
1123	VEMO 2A		VENEZUELA	Morrocoy	*Isognomon alatus*	75	150	ARCHIVE
1124	VEMO 2B		VENEZUELA	Morrocoy	*Isognomon alatus*	75	150	ARCHIVE
1125	VEMO 3A		VENEZUELA	Morrocoy	*Isognomon alatus*	75	140	ARCHIVE
1126	VEMO 3B		VENEZUELA	Morrocoy	*Isognomon alatus*	75	140	ARCHIVE
1127	VECU 1A		VENEZUELA	Cumana	*Trachycardium isocardia*	25	190	ARCHIVE
1128	VECU 1B		VENEZUELA	Cumana	*Trachycardium isocardia*	25	190	ARCHIVE
1129	VECU 2A		VENEZUELA	Cumana	*Trachycardium isocardia*	25	170	ARCHIVE
1130	VECU 2B		VENEZUELA	Cumana	*Trachycardium isocardia*	25	170	GERG
1131	TRCS 1A		TRINIDAD, WEST INDIES	Caroni Swamp	*Mytella guayanensis*	40	140	ARCHIVE/SIUNG-CHANG
1132	TRCS 1B		TRINIDAD, WEST INDIES	Caroni Swamp	*Mytella guayanensis*	40	140	GERG/SIUNG-CHANG
1133	TRCS 2A		TRINIDAD, WEST INDIES	Caroni Swamp	*Mytella guayanensis*	40	140	ARCHIVE/SIUNG-CHANG
1134	TRCS 2B		TRINIDAD, WEST INDIES	Caroni Swamp	*Mytella guayanensis*	40	120	ILMR/SIUNG-CHANG
1135	TRSR 1A		TRINIDAD, WEST INDIES	Southern Range	*Donax denticulatus*	175	140	ARCHIVE/SIUNG-CHANG
1136A	TRSR 1B		TRINIDAD, WEST INDIES	Southern Range	*Donax denticulatus*	175	120	GERG/SIUNG-CHANG

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Smpl ID	Code	Cho lera	Country	Location	Bivalve	n	wet wt.	Status
1136B	TRSR 1B		TRINIDAD, WEST INDIES	Southern Range	*Donax denticulatus*	175	120	GERG/SIUNG-CHANG
1136S	TRSR 1B		TRINIDAD, WEST INDIES	Southern Range	*Donax denticulatus*	170	120	GERG
1137	TRSR 2A		TRINIDAD, WEST INDIES	Southern Range	*Donax denticulatus*	175	140	ARCHIVE/SIUNG-CHANG
1138	TRSR 2B		TRINIDAD, WEST INDIES	Southern Range	*Donax denticulatus*	175	140	ARCHIVE/SIUNG-CHANG
1139	TRSR 3A		TRINIDAD, WEST INDIES	Southern Range	*Donax denticulatus*	175	140	ARCHIVE/SIUNG-CHANG
1140	TRSR 3B		TRINIDAD, WEST INDIES	Southern Range	*Donax denticulatus*	175	140	ARCHIVE/SIUNG-CHANG
1141	ARCB 1A		ARUBA	Commander's Bay	*Ctenoidies scabra*	20	170	ARCHIVE
1142	ARCB 1B		ARUBA	Commander's Bay	*Ctenoidies scabra*	20	160	GERG
1143	ARCB 2A		ARUBA	Commander's Bay	*Ctenoidies scabra*	20	170	ARCHIVE
1144	ARCB 2B		ARUBA	Commander's Bay	*Ctenoidies scabra*	20	140	ARCHIVE
1145	ARCB 3A		ARUBA	Commander's Bay	*Ctenoidies scabra*	20	140	ARCHIVE
1146	ARCB 3B		ARUBA	Commander's Bay	*Ctenoidies scabra*	20	120	ARCHIVE
1147	CRTO 1A		COSTA RICA	Tortuguero	*To be identified*	20	100	ARCHIVE
1148	CRTO 1B		COSTA RICA	Tortuguero	*To be identified*	20	170	GERG
1149	CRTO 2A		COSTA RICA	Tortuguero	*To be identified*	20	160	ARCHIVE
1150	CRTO 2B		COSTA RICA	Tortuguero	*To be identified*	20	180	ARCHIVE
1151	CRTO 3A		COSTA RICA	Tortuguero	*To be identified*	20	150	ARCHIVE
1152	CRTO 3B		COSTA RICA	Tortuguero	*To be identified*	20	150	ARCHIVE
1153	BRSB 1A		BRAZIL	Santos	*Perna perna*	60	140	GERG/WEBER.
1154	BRSB 1B		BRAZIL	Santos	*Perna perna*	60	150	ILMR/WEBER
1155	BRSB 2A		BRAZIL	Santos	*Perna perna*	60	160	ARCHIVE/WEBER
1156	BRSB 2B		BRAZIL	Santos	*Perna perna*	60	150	ARCHIVE/WEBER

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Smpl ID	Code		Cholera	Country	Location	Bivalve	n	wet wt.	Status
1157	BRSB	3A		BRAZIL	Santos	*Perna perna*	60	150	ARCHIVE/WEBER
1158	BRSB	3B		BRAZIL	Santos	*Perna perna*	60	160	ARCHIVE/WEBER
1159	PABI	1A	C	BRAZIL	Salvador	*Mytella guayanensis*	100	170	GERG/WEBER
1160	BRSA	1B	C	BRAZIL	Salvador	*Mytella guayanensis*	100	170	ARCHIVE/WEBER
1161	BRSA	1C	C	BRAZIL	Salvador	*Crassostrea rizhophora*	60	150	GERG/WEBER
1162	BRSA	1D	C	BRAZIL	Salvador	*Anomalocardia brasiliana*	150	180	GERG/WEBER
1163	BRRE	1A	C	BRAZIL	Recife	*Crassostrea rizhophora*	75	140	GERG/WEBER
1164	BRRE	1B	C	BRAZIL	Recife	*Crassostrea rizhophora*	75	150	ILMR/WEBER
1165	BRRE	2A	C	BRAZIL	Recife	*Crassostrea rizhophora*	75	140	ARCHIVE/WEBER
1166	BRRE	2B	C	BRAZIL	Recife	*Crassostrea rizhophora*	75	160	ARCHIVE/WEBER
1167	BRRE	3A	C	BRAZIL	Recife	*Mytella falcata*	200	130	GERG/WEBER
1168	no sample						0	0	
1169	BRLM	1A	C	BRAZIL	Lagoa Mundaú	*Mytella falcata*	200	200	ARCHIVE/WEBER
1170	BRLM	1B	C	BRAZIL	Lagoa Mundaú	*Mytella falcata*	200	200	ILMR/WEBER
1171	BRFO	1A	C	BRAZIL	Fortaleza	*Crassostrea rizhophora*	100	160	GERG/WEBER
1172	no sample						0	0	
1173	BRFO	2A	C	BRAZIL	Fortaleza	*Crassostrea rizhophora*	100	160	ARCHIVE/WEBER
1174	no sample						0	0	
1175	BRFO	3A	C	BRAZIL	Fortaleza	*Mytella guayanensis*	60	150	GERG/WEBER
1176	BRFO	3B	C	BRAZIL	Fortaleza	*Mytella guayanensis*	60	150	ILMR/WEBER
1177	BRSL	1A	C	BRAZIL	Sao Luis	*Mytella guayanensis*	50	160	GERG/WEBER
1178	BRSL	1B	C	BRAZIL	Sao Luis	*Mytella guayanensis*	50	170	ARCHIVE/WEBER
1179	BRSL	2A	C	BRAZIL	Sao Luis	*Mytella guayanensis*	50	140	ARCHIVE/WEBER
1180	BRSL	2B	C	BRAZIL	Sao Luis	*Mytella guayanensis*	50	150	ARCHIVE/WEBER

IMW SAMPLE INVENTORY INITIAL IMPLEMENTATION PHASE

Smpl ID	Code		Cholera	Country	Location	Bivalve	n	wet wt.	Status
1181	BRBR	1A	C	BRAZIL	Bragança	*Mytella falcata*	100	190	ARCHIVE/WEBER
1182	BRBR	1B	C	BRAZIL	Bragança	*Mytella falcata*	100	200	ILMR/WEBER
1183A	BRVI	1A		BRAZIL	Vitoria	*Perna perna*	60	210	GERG/WEBER
1183B	BRVI	1A		BRAZIL	Vitoria	*Perna perna*	60	210	GERG/WEBER
1184	BRVI	1B		BRAZIL	Vitoria	*Perna perna*	60	210	ARCHIVE/WEBER
1185	BRVI	2A		BRAZIL	Vitoria	*Perna perna*	60	200	ARCHIVE/WEBER
1186	BRVI	2B		BRAZIL	Vitoria	*Perna perna*	60	200	ARCHIVE/WEBER
1187	BRCF	1A		BRAZIL	Cabo Frio	*Perna perna*	40	130	GERG/WEBER
1188	BRCF	1B		BRAZIL	Cabo Frio	*Perna perna*	40	130	ARCHIVE/WEBER
1189	BRCF	2A		BRAZIL	Cabo Frio	*Perna perna*	40	140	ARCHIVE/WEBER
1190	BRCF	2B		BRAZIL	Cabo Frio	*Perna perna*	40	130	ILMR/WEBER
1191	BRCF	3A		BRAZIL	Cabo Frio	*Perna perna*	40	130	ARCHIVE/WEBER
1192	BRCF	3B		BRAZIL	Cabo Frio	*Perna perna*	40	140	ARCHIVE/WEBER
1193	BRGB	1A		BRAZIL	Bahía Guanabara	*Mytilus edulis platensis*	40	130	GERG/WEBER
1194	BRGB	1B		BRAZIL	Bahía Guanabara	*Mytilus edulis platensis*	40	130	ILMR/WEBER
1195	BRPB	1A		BRAZIL	Bahía Paranagua	*Mytilus sp?*	60	150	GERG/WEBER
1196	BRPB	1B		BRAZIL	Bahía Paranagua	*Mytilus sp?*	60	130	ARCHIVE/WEBER
1197	BRPB	2A		BRAZIL	Bahía Paranagua	*Mytilus sp?*	60	140	ARCHIVE/WEBER
1198	BRPB	2B		BRAZIL	Bahía Paranagua	*Mytilus sp?*	60	160	ILMR/WEBER
1199	BRLP	1A		BRAZIL	Lagoa dos Patos	*Perna perna*	50	180	GERG/WEBER/NIENKI
1200	BRLP	1B		BRAZIL	Lagoa dos Patos	*Perna perna*	50	200	ARCHIVE/WEBER/NIENKI
1201	BRLP	2A		BRAZIL	Lagoa dos Patos	*Perna perna*	50	210	ARCHIVE/WEBER/NIENKI
1202	BRLP	2B		BRAZIL	Lagoa dos Patos	*Perna perna*	50	220	ILMR/WEBER/NIENKI
1203	CHPM	1A		CHILE	Puerto Montt	*Choromytilus chorus*	20	210	GERG
1204	CHPM	1B		CHILE	Puerto Montt	*Choromytilus chorus*	20	170	ARCHIVE
1205	CHPM	1C		CHILE	Puerto Montt	*Aulacomya ater*	20	170	GERG
1206	CHPM	1D		CHILE	Puerto Montt	*Aulacomya ater*	20	170	GERG

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Smpl ID	Code		Cho lera	Country	Location	Bivalve	n	wet wt.	Status
1207	CHPM	2A		CHILE	Puerto Montt	*Aulacomya ater*	20	190	ARCHIVE
1208	CHPM	2B		CHILE	Puerto Montt	*Aulacomya ater*	20	180	ILMR
1209	CHPA	1A		CHILE	Punta Arenas	*Choromytilus chorus*	30	190	GERG
1210	CHPA	1B		CHILE	Punta Arenas	*Choromytilus chorus*	30	190	ARCHIVE
1211	CHPA	2A		CHILE	Punta Arenas	*Choromytilus chorus*	30	170	GERG
1212	CHPA	2B		CHILE	Punta Arenas	*Choromytilus chorus*	30	170	ILMR
1213	CHPA	2C		CHILE	Punta Arenas	*Aulacomya ater*	30	160	GERG
1214	no sample						0	0	
1215	CHVA	1A		CHILE	Valparaiso	*Perumytilus pururatus*	125	190	ARCHIVE
1216	CHVA	1B		CHILE	Valparaíso	*Perumytilus pururatus*	125	200	ILMR
1217	CHLS	1A		CHILE	LA Serena	*Aulacomya ater*	15	200	GERG
1218	CHLS	1B		CHILE	LA Serena	*Aulacomya ater*	15	210	ILMR
1219	CHLS	1C		CHILE	LA Serena	*Aulacomya ater*	15	210	ARCHIVE
1220	no sample						0	0	
1221	CHAR	1A	C	CHILE	Arica	*Perumytilus purpuratus*	100	180	ARCHIVE
1222	CHAR	1B	C	CHILE	Arica	*Perumytilus purpuratus*	100	170	ILMR
1223	CHAR	2A	C	CHILE	Arica	*Perumytilus purpuratus*	100	160	ARCHIVE
1224	CHAR	2B	C	CHILE	Arica	*Perumytilus purpuratus*	100	160	ARCHIVE
1225A	CHAR	3A	C	CHILE	Arica	*Perumytilus purpuratus*	100	140	GERG
1225B	CHAR	3A	C	CHILE	Arica	*Perumytilus purpuratus*	100	140	GERG
1225S	CHAR	3A	C	CHILE	Arica	*Perumytilus purpuratus*	100	140	GERG
1226	CHAR	3B	C	CHILE	Arica	*Perumytilus purpuratus*	100	150	ARCHIVE
1227	CHAN	1A	C	CHILE	Antofagasta	*Aulacomya ater*	30	200	ARCHIVE
1228	CHAN	1B	C	CHILE	Antofagasta	*Aulacomya ater*	30	200	ILMR
1229	CHCO	1A		CHILE	Concepcion	*Perumytilus purpuratus*	100	140	GERG/GALLARDO

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Smpl ID	Code		Cholera	Country	Location	Bivalve	n	wet wt.	Status
1230	CHCO	1B		CHILE	Concepcion	*Perumytilus purpuratus*	100	130	ARCHIVE/GALLARDO
1231	CHCO	2A		CHILE	Concepcion	*Perumytilus purpuratus*	100	170	GERG/GALLARDO
1232	no sample						0	0	
1233	CHCO	3A		CHILE	Concepcion	*Perumytilus purpuratus*	100	180	ARCHIVE/GALLARDO
1234	CHCO	3B		CHILE	Concepcion	*Perumytilus purpuratus*	100	180	ILMR/GALLARDO
1235A	PECA	1A	C	PERU	Callao	*Semimytilus algosus*	100	210	GERG
1235B	PECA	1A	C	PERU	Callao	*Semimytilus algosus*	100	210	GERG
1235S	PECA	1A	C	PERU	Callao	*Semimytilus algosus*	100	210	GERG
1236	no sample						0	0	
1237	PECA	2A	C	PERU	Callao	*Semimytilus algosus*	100	150	ARCHIVE
1238	no sample						0	0	
1239	PEPA	1A	C	PERU	Paracas	*Semimytilus algosus*	100	160	GERG/JANIOT
1240	PEPA	1B	C	PERU	Paracas	*Semimytilus algosus*	100	190	ILMR/JACINTO
1241	PEPA	2A	C	PERU	Paracas	*Perumytilus purpuratus*	100	180	GERG/JANIOT
1242	PEPA	2B	C	PERU	Paracas	*Perumytilus purpuratus*	100	180	ILMR/JACINTO
1243	ECGU	1A	C	ECUADOR	Guayaquil	*Mytilus guayanensis*	50	150	ARCHIVE/SOLORZANO
1244	ECGU	1B	C	ECUADOR	Guayaquil	*Mytilus guayanensis*	50	140	ILMR/SOLORZANO
1245	ECGU	2A	C	ECUADOR	Guayaquil	*Mytilus guayanensis*	50	160	ARCHIVE/SOLORZANO
1246	ECGU	2B	C	ECUADOR	Guayaquil	*Mytilus guayanensis*	50	160	ARCHIVE/SOLORZANO
1247	ECCR	1A	C	ECUADOR	Río Chone	*Protothaca grata*	25	170	GERG/SOLORZANO
1248	ECCR	1B	C	ECUADOR	Río Chone	*Protothaca grata*	25	180	ILMR/SOLORZANO
1249	ECCR	1C	C	ECUADOR	Río Chone	*Anadara tuberculosa*	25	160	GERG/SOLORZANO
1250	no sample						0	0	
1251	ESGF	1A		EL SALVADOR	Puerto La Union	*Anadara tuberculosa*	25	190	ARCHIVE

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Smpl ID	Code		Cholera	Country	Location	Bivalve	n	wet wt.	Status
1252	ESGF	1B		EL SALVADOR	Puerto La Union	*Anadara tuberculosa*	25	200	ILMR
1253	ESGF	2A		EL SALVADOR	Puerto La Union	*Anadara tuberculosa*	25	180	ARCHIVE
1254	ESGF	2B		EL SALVADOR	Puerto La Union	*Anadara tuberculosa*	25	200	ARCHIVE
1255	ESLL	1A		EL SALVADOR	La Libertad	*Crassostrea corteziensis*	20	120	ARCHIVE
1256	ESLL	1B		EL SALVADOR	La Libertad	*Crassostrea corteziensis*	20	120	GERG
1257	BEBC	1A		BELIZE	Belize City	*Crassostrea rizhophorae*	75	140	ARCHIVE
1258	BEBC	1B		BELIZE	Belize City	*Crassostrea rizhophorae*	75	140	ILMR
1259	HOLC	1A		HONDURAS, C.A.	La Ceiba	*Donax denticulatus*	250	110	ARCHIVE
1260	HOLC	1B		HONDURAS, C.A.	La Ceiba	*Donax denticulatus*	250	110	GERG
1261	HOGF	1A		HONDURAS, C.A.	San Lorenzo	*Anadara similis*	15	190	ARCHIVE
1262	HOGF	1B		HONDURAS, C.A.	San Lorenzo	*Anadara similis*	15	180	GERG
1263	HOGF	1C		HONDURAS, C.A.	San Lorenzo	*Anadara tuberculosa*	15	170	GERG
1264	HOGF	1D		HONDURAS, C.A.	San Lorenzo	*Anadara tuberculosa*	15	170	ARCHIVE
1265	HOGF	2A		HONDURAS, C.A.	San Lorenzo	*Anadara similis*	15	170	ARCHIVE
1266	HOGF	2B		HONDURAS, C.A.	San Lorenzo	*Anadara similis*	15	180	ARCHIVE
1267	JABO	1A		JAMAICA	Bowden	*Isognomon alatus*	50	130	GERG
1268	JABO	1B		JAMAICA	Bowden	*Isognomon alatus*	50	120	ILMR
1269	JABO	2A		JAMAICA	Bowden	*Isognomon alatus*	50	150	ARCHIVE
1270	JABO	2B		JAMAICA	Bowden	*Isognomon alatus*	50	150	ARCHIVE
1271	JAPR	1A		JAMAICA	Port Royal	*Isognomon alatus*	50	150	ARCHIVE
1272	JAPR	1B		JAMAICA	Port Royal	*Isognomon alatus*	50	150	GERG
1273	JAPR	2A		JAMAICA	Port Royal	*Isognomon alatus*	50	160	ARCHIVE
1274	JAPR	2B		JAMAICA	Port Royal	*Isognomon alatus*	50	150	ARCHIVE
1275	MELT	1A		MEXICO	Laguna de Términos	*Crassostrea virginica*	20	130	GERG

IMW SAMPLE INVENTORY INITIAL IMPLEMENTATION PHASE

Smpl ID	Code		Cholera	Country	Location	Bivalve	n	wet wt.	Status
1276	MELT	1B		MEXICO	Laguna de Términos	*Crassostrea virginica*	20	130	ARCHIVE
1277	MELT	2A		MEXICO	Laguna de Términos	*Crassostrea virginica*	20	130	ARCHIVE
1278	MELT	2B		MEXICO	Laguna de Términos	*Crassostrea virginica*	20	130	ARCHIVE
1279	MELO	1A		MEXICO	Laguna de Ostion	*Crassostrea virginica*	20	160	GERG
1280	MELO	1B		MEXICO	Laguna de Ostion	*Crassostrea virginica*	20	160	ILMR
1281	MELO	2A		MEXICO	Laguna de Ostion	*Crassostrea virginica*	20	150	ARCHIVE
1282	MELO	2B		MEXICO	Laguna de Ostion	*Crassostrea virginica*	20	169	ARCHIVE
1283	MELV	1A		MEXICO	Bahia Ventosa	*Crassostrea corteziensis*	20	160	GERG
1284	no sample						0	0	
1285	MELV	2A		MEXICO	Bahia Ventosa	*Crassostrea corteziensis*	20	140	ARCHIVE
1286	MELV	2B		MEXICO	Bahia Ventosa	*Crassostrea corteziensis*	20	140	ILMR
1287	MELV	3A		MEXICO	Bahia Ventosa	*Crassostrea corteziensis*	20	150	ARCHIVE
1288	MELV	3B		MEXICO	Bahia Ventosa	*Crassostrea corteziensis*	20	140	ARCHIVE
1289	MEPE	1A		MEXICO	Puerto Escondido	*Crassostrea corteziensis*	12	340	GERG
1290	MEPE	1A		MEXICO	Puerto Escondido	*Crassostrea corteziensis*	12	350	ARCHIVE
1291	MEPM	1A		MEXICO	Puerto Madero	*Crassostrea corteziensis*	20	200	GERG
1292	MEPM	1B		MEXICO	Puerto Madero	*Crassostrea corteziensis*	20	170	ILMR
1293	META	1A		MEXICO	Tampico	*Crassostrea virginica*	20	160	GERG
1294	META	1B		MEXICO	Tampico	*Crassostrea virginica*	20	150	ARCHIVE

IMW SAMPLE INVENTORY INITIAL IMPLEMENTATION PHASE

Smpl ID	Code	Cho lera	Country	Location	Bivalve	n	wet wt.	Status
1295	META 2A		MEXICO	Tampico	*Crassostrea virginica*	20	160	ARCHIVE
1296	no sample					0	0	
1297	MELM 1A		MEXICO	Laguna Madre	*Crassostrea virginica*	20	160	GERG
1298	MELM 1B		MEXICO	Laguna Madre	*Crassostrea virginica*	20	180	ARCHIVE
1299	MELM 2A		MEXICO	Laguna Madre	*Crassostrea virginica*	20	160	ARCHIVE
1300	MELM 2B		MEXICO	Laguna Madre	*Crassostrea virginica*	20	170	ARCHIVE
1301A	MEPB 1A		MEXICO	Punta Banderas	*Mytilus californianus*	40	200	GERG
1301B	MEPB 1A		MEXICO	Punta Banderas	*Mytilus californianus*	40	200	GERG
1301S	MEPB 1A		MEXICO	Punta Banderas	*Mytilus californianus*	40	200	GERG
1302	MEPB 1B		MEXICO	Punta Banderas	*Mytilus californianus*	40	170	ARCHIVE
1303	MEEN 1A		MEXICO	Ensenada	*Mytilus californianus*	40	190	GERG
1304	MEEN 1B		MEXICO	Ensenada	*Mytilus californianus*	40	190	ILMR
1305	MESF 1A		MEXICO	San Felipe	*Crassostrea columbiensis*	30	170	GERG
1306	MESF 1B		MEXICO	San Felipe	*Crassostrea columbiensis*	30	180	ARCHIVE
1307	MESC 1A		MEXICO	San Carlos	*Chione undatella*	25	150	GERG
1308	MESC 1B		MEXICO	San Carlos	*Chione undatella*	25	150	ARCHIVE
1309	MEMA 1A		MEXICO	Mazatlan	*Crassostrea corteziensis*	12	200	GERG
1310	MEMA 1A		MEXICO	Mazatlan	*Crassostrea corteziensis*	12	200	ARCHIVE
1311	MEMA 2A		MEXICO	Mazatlan	*Crassostrea corteziensis*	20	220	ARCHIVE
1312	no sample					0	0	
1313	CUCC 1A		CUBA	Cayo Culebra	*Isognomon alatus*	100	150	GERG
1314	CUCC 1B		CUBA	Cayo Culebra	*Isognomon alatus*	100	170	ILMR

IMW SAMPLE INVENTORY INITIAL IMPLEMENTATION PHASE

Smpl ID	Code	Cholera	Country	Location	Bivalve	n	wet wt.	Status
1315	CUCC 2A		CUBA	Cayo Culebra	*Isognomon alatus*	100	180	ARCHIVE
1316	CUCC 2B		CUBA	Cayo Culebra	*Isognomon alatus*	100	180	ARCHIVE
1317	MEAP 1A		MEXICO	Altata-Pabellon	*Crassostrea rizhophorae*	400	130	GERG
1318	MEAP 1B		MEXICO	Altata-Pabellon	*Crassostrea rizhophorae*	40	100	ILMR
1319	MEAP 2A		MEXICO	Altata-Pabellon	*Crassostrea rizhophorae*	40	100	ARCHIVE
1320	MEAP 2B		MEXICO	Altata-Pabellon	*Crassostrea rizhophorae*	40	90	ARCHIVE
1321	MEAP 3A		MEXICO	Altata-Pabellon	*Crassostrea rizhophorae*	40	110	ARCHIVE
1322	MEAP 3B		MEXICO	Altata-Pabellon	*Crassostrea rizhophorae*	40	100	ARCHIVE
1401	DI119		USA	Deer Island	*Mytilus edulis*	0	0	GERG
1402	DI227		USA	Deer Island	*Mytilus edulis*	0	0	GERG
1403	DI530		USA	Deer Island	*Mytilus edulis*	0	0	GERG
1404	SITXA		USA	Staten Island	*Mytilus edulis*	0	0	GERG
1405	SITXB		USA	Staten Island	*Mytilus edulis*	0	0	GERG
1406	SITXC		USA	Staten Island	*Mytilus edulis*	0	0	GERG
1407	NIST-TX		USA	NOAA QA92TIS4	*Mytilus edulis*	0	0	GERG
1408	BLTX1		USA	GERG Blank		0	0	GERG
1409	DI179		USA	Deer Island	*Mytilus edulis*	0	0	ILMR
1410	DI293		USA	Deer Island	*Mytilus edulis*	0	0	ILMR
1411	DI492		USA	Deer Island	*Mytilus edulis*	0	0	ILMR
1412	no sample					0	0	
1413	XXMN		UNKNOWN	Unknown		0	0	ILMR
1415	NISTMN			ILMR Blank NIST		0	0	ILMR

IMW SAMPLE INVENTORY INITIAL IMPLEMENTATION PHASE

Smpl ID	Code	Cholera	Country	Location	Bivalve	n	wet wt.	Status
1315	CUCC 2A		CUBA	Cayo Culebra	*Isognomon alatus*	100	180	ARCHIVE
1316	CUCC 2B		CUBA	Cayo Culebra	*Isognomon alatus*	100	180	ARCHIVE
1317	MEAP 1A		MEXICO	Altata-Pabellon	*Crassostrea rizhophorae*	400	130	GERG
1318	MEAP 1B		MEXICO	Altata-Pabellon	*Crassostrea rizhophorae*	40	100	ILMR
1319	MEAP 2A		MEXICO	Altata-Pabellon	*Crassostrea rizhophorae*	40	100	ARCHIVE
1320	MEAP 2B		MEXICO	Altata-Pabellon	*Crassostrea rizhophorae*	40	90	ARCHIVE
1321	MEAP 3A		MEXICO	Altata-Pabellon	*Crassostrea rizhophorae*	40	110	ARCHIVE
1322	MEAP 3B		MEXICO	Altata-Pabellon	*Crassostrea rizhophorae*	40	100	ARCHIVE
1401	DI119		USA	Deer Island	*Mytilus edulis*	0	0	GERG
1402	DI227		USA	Deer Island	*Mytilus edulis*	0	0	GERG
1403	DI530		USA	Deer Island	*Mytilus edulis*	0	0	GERG
1404	SITXA		USA	Staten Island	*Mytilus edulis*	0	0	GERG
1405	SITXB		USA	Staten Island	*Mytilus edulis*	0	0	GERG
1406	SITXC		USA	Staten Island	*Mytilus edulis*	0	0	GERG
1407	NIST-TX		USA	NOAA QA92TIS4	*Mytilus edulis*	0	0	GERG
1408	BLTX1		USA	GERG Blank		0	0	GERG
1409	DI179		USA	Deer Island	*Mytilus edulis*	0	0	ILMR
1410	DI293		USA	Deer Island	*Mytilus edulis*	0	0	ILMR
1411	DI492		USA	Deer Island	*Mytilus edulis*	0	0	ILMR
1412	no sample					0	0	
1413	XXMN		UNKNOWN	Unknown		0	0	ILMR
1415	NISTMN			ILMR Blank NIST		0	0	ILMR

IMW SAMPLE INVENTORY INITIAL IMPLEMENTATION PHASE

Smpl ID	Code	Cholera	Country	Location	Bivalve	n	wet wt.	Status
1416	BLMN1			ILMR Blank 1		0	0	ILMR
1417	BLTX2			GERG Blank 2		0	0	GERG
1418	BLTX3			GERG Blank 3		0	0	GERG
1419	BLTX4			GERG Blank 4		0	0	GERG
1420	BLTX5			GERG Blank 5		0	0	GERG
1421	BLTX6			GERG Blank 6		0	0	GERG
1422	NOMN1A			NOAA QA		0	0	ILMR
1423	NOMN1B			NOAA QA		0	0	ILMR
1424	NOMN1C			NOAA QA		0	0	ILMR
1425	NOMN2			NOAA QA		0	0	ILMR
1426	NOMN3			NOAA QA		0	0	ILMR
1427	BLMN2			ILMR Blank 2		0	0	ILMR
1428	BLMN3			ILMR Blank 3		0	0	ILMR
1429	BLMN4			ILMR Blank 4		0	0	ILMR
1430	BLMN5			ILMR Blank 5		0	0	ILMR
1431	BLMN6			ILMR Blank 6		0	0	ILMR
1432	BLMN7			ILMR Blank 7		0	0	ILMR
1433	BLMN8			ILMR Blank 8		0	0	ILMR
1434	NOTX1A			NOAA QA74		0	0	GERG
1435	NOTX1B			NOAA QA74		0	0	GERG
1436	NOTX1C			NOAA QA74		0	0	GERG
1437	NOTX1D			NOAA QA74		0	0	GERG
1438	NOTX1E			NOAA QA74		0	0	GERG
1439	NOTX1F			NOAA QA74		0	0	GERG
1440	NOTX1G			NOAA QA74		0	0	GERG
1441	BLTX7			GERG Blank 7		0	0	GERG

IMW SAMPLE INVENTORY INITIAL IMPLEMENTATION PHASE

Smpl ID	Code	Cholera	Country	Location	Bivalve	n	wet wt.	Status
1442	BLTX8			GERG Blank 8		0	0	GERG
1443	NOTX2A			NOAA QA92		0	0	GERG
1444	NOTX2B			NOAA QA92		0	0	GERG
1445	NOTX2C			NOAA QA92		0	0	GERG
1446	NOTX2D			NOAA QA92		0	0	GERG
1447	NOTX2E			NOAA QA92		0	0	GERG
1448	SIMNA		USA	Staten Island	*Mytilus edulis*	0	0	ILMR
1449	SIMNB		USA	Staten Island	*Mytilus edulis*	0	0	ILMR
1450	SIMNC		USA	Staten Island	*Mytilus edulis*	0	0	ILMR

Int' Mussel Watch - Pesticide & PCB Analysis (nd/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	Total BHCs	Total Chlordane	Total DDTs	"Total" PCBs	g Dry Weight Extd	DryWet %	Lipid (mg/gdw)
Laguna Madre	1297	MELM	13.43	14.08	14.47	103.7	1.85	0.12	23
Tampico	1293	META	0.41	13.76	112.25	38.8	1.59	0.1	90
Laguna de Ostion	1279	MELO	0.56	5.32	166.29	42.2	1.22	0.08	77
Laguna de Ostion	1280	MELO	N.D.	N.D.	110.4	N.D.	4	0.09	64mg/g
Laguna de Términos	1275	MELT	0.37	2.6	24.45	7.5	1.63	0.11	73
Belize City	1258	BEBC	N.D.	N.D.	59.87	N.D.	4	0.1	41mg/g
La Ceiba	1260	HOLC	0.43	0.46	7.08	3.2	2.26	0.15	38
Tortuguero	1148	CRTO	0.36	1.26	14.63	6.5	1.88	0.12	35
Puerto Almirante	1092	PAPA	0.43	6.21	24.73	12.5	2.74	0.18	68
Portobelo	1057	PAPB	1.22	2.28	4.59	7.3	1.95	0.12	32
Bahia de Cartagena	1096	COBC	0.66	1.25	2.21	6	2.18	0.14	31
Bahia de Cartagena	1098	COBC	0.86	1.15	4.64	5.3	3.56	0.24	11
Clenaga Grande	1100	COCG	0.72	2.78	7.18	8.3	2.07	0.14	35
Clenaga Grande	1102	COCG	N.D.	N.D.	7.48	N.D.	5	0.19	93mg/g
Commander's Bay	1142	ARCB	0.53	6.54	12.83	441.6	2.42	0.16	33
Morrocoy	1122	VEMO	N.D.	N.D.	0.84	N.D.	5	0.18	52mg/g
Paparo	1116	VEPA	0.46	0.99	3.73	76.4	2.77	0.18	31
Cumana	1130	VECU	Tr	1.25	3.9	9.8	2.84	0.19	15
Caroni Swamp	1132	TRCS	0.81	2.39	4.05	13.8	2.02	0.13	37
Caroni Swamp	1134	TRCS	N.D.	N.D.	6.73	N.D.	5	0.11	43mg/g
Southern Range	1136A	TRSR	0.95	1.05	0.47	5.5	2.83	0.19	58
Southern Range	1136B	TRSR	0.85	1	0.47	5.9	2.84	0.18	58
Bowden	1267	JABO	0.95	1.39	5.45	11.3	2.51	0.16	89

Int' Mussel Watch - Pesticide & PCB Analysis (nd/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	Total BHCs	Total Chlordane	Total DDTs	"Total" PCBs	g Dry Weight Extd	DryWet %	Lipid (mg/gdw)
Bowden	1268	JABO	N.D.	N.D.	7.31	N.D.	5	0.16	60mg/g
Port Royal	1272	JAPR	3.43	7.87	24.02	36.1	2.51	0.16	92
Cayo Culebra	1313	CUCC	1.08	4.08	2.46	11.5	2.7	0.18	55
Cayo Culebra	1314	CUCC	N.D.	N.D.	2.01	N.D.	5	0.15	50mg/g
Bragança	1182	BRBR	N.D.	N.D.	3.39	N.D.	5	0.13	36mg/g
Sao Luis	1177	BRSL	1.95	1.47	62.16	19.8	1.88	0.12	46
Fortaleza	1171	BRFO	3.07	5.17	12.83	23	1.44	0.1	29
Fortaleza	1175	BRFO	2.16	3.46	93.56	23.6	2.41	0.16	43
Fortaleza	1176	BRFO	N.D.	N.D.	174.93	N.D.	5	0.16	44mg/g
Recife	1163	BRRE	1.28	5.47	77.1	164.1	2.32	0.15	30
Recife	1164	BRRE	N.D.	N.D.	32.6	N.D.	5	0.13	43mg/g
Recife	1167	BRRE	3.3	12.61	123.03	277.6	2.16	0.14	55
Lagoa Mundaú	1170	BRLM	N.D.	N.D.	80.64	N.D.	5	0.11	54mg/g
Salvador	1159	PABI	0.89	4.5	N.D.	N.D.			
Salvador	1161	BRSA	2.21	2.87	14.86	17.3	2.57	0.17	52
Salvador	1162	BRSA	N.D.	2.59	8.92	18	2.21	0.15	48
Vitoria	1183A	BRVI	6.14	7.18	32.51	83.6	2.85	0.18	79
Vitoria	1183B	BRVI	5.81	7.95	31.57	93.2	2.71	0.18	147
Cabo Frio	1187	BRCF	1.57	1.5	3.67	24.9	2.55	0.16	48
Cabo Frio	1190	BRCF	N.D.	N.D.	11.84	N.D.	5	0.16	73mg/g
Bahía Guanabara	1193	BRGB	29.5	18.95	24.48	211.9	3.46	0.23	135
Bahía Guanabara	1194	BRGB	N.D.	N.D.	24.63	N.D.	5	0.2	80mg/g
Santos	1153	BRSB	95.77	14.2	41.28	66	3.18	0.03	126
Santos	1154	BRSB	N.D.	N.D.	9.75	N.D.	5	0.21	74mg/g
Bahía Paranagua	1195	BRPB	0.32	0.55	7	8.3	1.82	0.12	34

Int' Mussel Watch - Pesticide & PCB Analysis (nd/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	Total BHCs	Total Chlordane	Total DDTs	"Total" PCBs	g Dry Weight Extd	DryWet %	Lipid (mg/gdw)
Bahia Paranagua	1198	BRPB	N.D.	N.D.	10.53	N.D.	5	0.13	40mg/g
Lagoa dos Patos	1199	BRLP	0.63	3.71	0.82	37.4	2.79	0.18	140
Lagoa dos Patos	1202	BRLP	N.D.	N.D.	2.96	N.D.	5	0.17	81mg/g
Punta del Este	1014	URPE	N.D.	N.D.	10.97	N.D.	5.35	0.13	60mg/g
Santa Lucia	1020	URSL	4.36	9.93	38.42	88.6	1.35	0.09	91
Hudson	1002	ARHU	N.D.	N.D.	N.D.	N.D.	5.23	0.16	110mg/g
Hudson	1004	ARHU	25.8	535.47	235.56	3837.4	2.16	0.14	121
Atalaya	1008	ARAT	9.64	63.35	67.22	1455.1	4.15	0.27	74
Mar del Plata	1024	ARMP	1.08	2.16	1.06	8.6	2.83	0.19	40
Pehuen-co	1027A	ARPC	5.92	7.61	3.36	44.1	2.11	0.13	74
Pehuen-co	1027B	ARPC	6.71	9.93	3.77	43.5	1.94	0.13	73
Arroyo Parejas	1029	ARAP	7.94	18.28	26.65	126.9	4.17	0.27	66
Rawson	1033	ARRA	6.99	3.01	2.02	14.4	2.83	0.18	101
Bahia Camarones	1037	ARCA	N.D.	3.38	4.91	14.7	2.81	0.18	101
Bahia Camarones	1040	ARCA	0.39	0.93	1.2	7.3	3.01	0.19	48
Bahia Camarones	1042	ARCA	N.D.	N.D.	4.36	N.D.	5.14	0.17	74mg/g
Bahia Camarones	1043	ARCA	4.85	9.09	6.55	46.1	2.57	0.17	60
Punta Loyola	1052	ARPL	2.65	5.33	2.91	21.6	2.28	0.15	86
Ushuaia	1046	ARUS	N.D.	N.D.	4.08	N.D.	5.1	0.17	64mg/g
Punta Arenas	1209	CHPA	9.37	4.03	16.94	184.7	3.13	0.2	62
Punta Arenas	1211	CHPA	6.22	3.24	11.56	163.2	2.92	0.19	36
Punta Arenas	1212	CHPA	N.D.	N.D.	14.23	N.D.	5	0.16	47mg/g
Punta Arenas	1213	CHPA	7.09	5.99	22.33	275.3	2.19	0.14	57
Puerto Montt	1203	CHPM	1.01	0.69	Tr	6.9	2.33	0.15	45
Puerto Montt	1205	CHPM	1.47	5.66	5.9	38.8	2.44	0.16	97

Int' Mussel Watch - Pesticide & PCB Analysis (nd/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	Total BHCs	Total Chlordane	Total DDTs	"Total" PCBs	g Dry Weight Extd	DryWet %	Lipid (mg/gdw)
Puerto Montt	1206	CHPM	0.46	0.82	0.57	3.7	3.06	0.2	61
Puerto Montt	1208	CHPM	N.D.	N.D.	3.33	N.D.	5	0.19	58mg/g
Concepcion	1229	CHCO	2.98	1.77	6.62	18.3	2.07	0.14	67
Concepcion	1231	CHCO	5.28	1.2	4.62	29.9	2.26	0.15	62
Concepcion	1234	CHCO	N.D.	N.D.	0.56	N.D.	5	0.13	58mg/g
Valparaiso	1216	CHVA	N.D.	N.D.	143.1	N.D.	5	0.22	93mg/g
LA Serena	1217	CHLS	0.41	5.89	2.62	9.5	4.04	0.26	61
LA Serena	1218	CHLS	N.D.	N.D.	1.21	N.D.	5	0.26	63mg/g
Antofagasta	1228	CHAN	N.D.	N.D.	21.74	N.D.	5	0.18	61mg/g
Arica	1222	CHAR	N.D.	N.D.	4.98	N.D.	5	0.17	55mg/g
Arica	1225A	CHAR	0.83	2.86	6.42	28.7	2.55	0.17	89
Arica	1225B	CHAR	0.61	2.71	6.78	29.2	2.53	0.17	88
Paracas	1239	PEPA	N.D.	2.62	10.89	18.2	2.45	0.16	60
Paracas	1240	PEPA	N.D.	N.D.	15.36	N.D.	5	0.14	48mg/g
Paracas	1241	PEPA	0.74	1.72	13.59	18.6	3.14	0.2	110
Paracas	1242	PEPA	N.D.	N.D.	12.41	N.D.	5	0.19	100mg/g
Callao	1235A	PECA	Tr	2.15	42.41	117.2	2.87	0.19	33
Callao	1235B	PECA	N.D.	2.21	49.57	132.5	2.47	0.16	46
Guayaquil	1244	ECGU	N.D.	N.D.	154.96	N.D.	3.5	0.07	63mg/g
Río Chone	1247	ECCR	0.63	2.57	30.8	16.6	1.45	0.1	38
Río Chone	1248	ECCR	N.D.	N.D.	16.38	N.D.	5	0.09	35mg/g
Río Chone	1249	ECCR	0.84	0.98	17.13	7.6	2.07	0.13	24
Bahia Tumaco	1107	COBT	N.D.	0.94	123.75	7.3	2.91	0.19	14
Bahia Tumaco	1110	COBT	N.D.	N.D.	20.69	N.D.	5	0.11	20mg/g
Bahia Tumaco	1111	COBT	0.71	2.04	45.56	20.7	1.69	0.11	25
Bahia Tumaco	1113	COBT	0.74	0.73	42.89	6.8	1.98	0.13	22
Playa Bique	1060	PABI	N.D.	N.D.	9.19	N.D.	5320	0.11	48mg/g
Punta Chame	1064	PAPC	0.62	N.D.	1.88	3	2.16	0.14	13

Int' Mussel Watch - Pesticide & PCB Analysis (nd/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	Total BHCs	Total Chlordane	Total DDTs	"Total" PCBs	g Dry Weight Extd	DryWet %	Lipid (mg/gdw)
Golfito	1082	CRGO	N.D.	2.11	27.76	15.7	2.02	0.13	24
Golfito	1083A	CRGO	0.86	1.9	38.75	12.4	2.52	0.16	25
Golfito	1083B	CRGO	1.14	1.99	36.72	10.1	2.51	0.16	18
Golfito	1085	CRGO	1.34	5.9	27.66	10.5	1.3	0.09	16
Punta Zancudo	1090	CRPZ	N.D.	N.D.	5.69	N.D.	5	0.11	18mg/g
Estero Jicaral	1072	CREJ	0.45	0.77	8.28	5.8	2.9	0.18	39
Isla Paloma	1075	CRIP	1.41	Tr	2.57	1.7	2.65	0.16	16
Estero Cocoroca	1077	CREC	N.D.	1.8	4.87	3.6	2.67	0.18	27
Estero Cocoroca	1078	CREC	N.D.	N.D.	4.14	N.D.	5	0.13	21mg/g
Estero Cocoroca	1079A	CREC	2.82	2.65	4.29	4.5	2.71	0.18	30
Estero Cocoroca	1079B	CREC	2.7	2.3	4.18	4.5	2.69	0.17	25
Ostional	1070	NIOS	N.D.	N.D.	2.41	N.D.	5.1	0.16	34mg/g
Isla de Aserradores	1066	NIIA	2.52	16	199.52	144.2	1.85	0.12	21
San Lorenzo	1262	HOGF	0.54	0.54	17.82	6.5	2.61	0.17	23
San Lorenzo	1263	HOGF	N.D.	0.72	12	6	2.1	0.14	16
Puerto La Union	1252	ESGF	N.D.	N.D.	11.85	N.D.	5	0.15	24mg/g
La Libertad	1256	ESLL	0.96	3.41	177.54	16.1	2.6	0.17	27
Puerto Madero	1292	MEPM	N.D.	N.D.	129.36	N.D.	5	0.14	31mg/g
Bahia Ventosa	1283	MELV	1.34	2.71	176.7	16.7	2.45	0.16	44
Bahia Ventosa	1286	MELV	N.D.	N.D.	42.85	N.D.	5	0.14	26mg/g
Puerto Escondido	1289	MEPE	0.45	1.16	48.04	1.8	1.27	0.08	8
Mazatlan	1309	MEMA	1.88	6.79	10.13	9.3	2.3	0.15	16
Altata-Pabellon	1317	MEAP	5.87	4.35	93.93	19.6	2.24	0.15	67
Altata-Pabellon	1318	MEAP	N.D.	N.D.	53.17	N.D.	3.7	0.11	70mg/g

Int' Mussel Watch - Pesticide & PCB Analysis (nd/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	Total BHCs	Total Chlordane	Total DDTs	"Total" PCBs	g Dry Weight Extd	DryWet %	Lipid (mg/gdw)
San Felipe	1305	MESF	Tr	6.11	9.18	13.3	2.3	0.15	84
San Carlos	1307	MESC	0.75	2.68	1.4	17.1	1.78	0.12	40
Ensenada	1303	MEEN	2.03	12.32	40.03	46.3	3.17	0.2	44
Ensenada	1304	MEEN	N.D.	N.D.	42.49	N.D.	5	0.15	48mg/g
Punta Banderas	1301A	MEPB	6.55	14.62	58.93	66.3	2.46	0.16	52
Punta Banderas	1301B	MEPB	6.59	15.67	59.58	65.5	2.4	0.16	57
Deer Island	1401	DI119	2.32	67.02	57.19	484.42			
Deer Island	1402	DI227	2.88	87.93	70.79	562.54			
Deer Island	1403	DI530	2.7	86.1	73.32	638.6			
Staten Island	1404	SITXA	3.28	103.02	104.44	1043.84			
Staten Island	1405	SITXB	3.21	96.85	109.74	1076.78			
Staten Island	1406	SITXC	3.16	107.32	119.41	1105.41			
GERG Blank	1408	BLTX1	Tr	0.46	0.65	19.79	0	0	0
Deer Island	1409	DI179	N.D.	N.D.	N.D.	N.D.	2		18mg/g
Deer Island	1410	DI293	N.D.	N.D.	51.61	N.D.	2		23mg/g
Deer Island	1411	DI492	N.D.	N.D.	50.62	N.D.	2		30mg/g
Unknown	1413	XXMN	N.D.	N.D.	N.D.	N.D.	1.5		35mg/g
ILMR Blank NIST	1415	NISTMN	N.D.	N.D.	N.D.	N.D.			
ILMR Blank 1	1416	BLMN1	N.D.	N.D.	N.D.	N.D.			
GERG Blank 2	1417	BLTX2	N.D.	N.D.	N.D.	3.4			
GERG Blank 3	1418	BLTX3	N.D.	N.D.	N.D.	1.4			
GERG Blank 4	1419	BLTX4	N.D.	N.D.	0.53	3.6			
GERG Blank 5	1420	BLTX5	N.D.	N.D.	0.78	10.8			
GERG Blank 6	1421	BLTX6	N.D.	N.D.	0.46	3.6			
NOAA QA	1422	NOMN1A	N.D.	N.D.	N.D.	N.D.	1.21		
NOAA QA	1423	NOMN1B	N.D.	N.D.	N.D.	N.D.	1.21		
NOAA QA	1424	NOMN1C	N.D.	N.D.	N.D.	N.D.	1.21		
NOAA QA	1425	NOMN2	N.D.	N.D.	N.D.	N.D.	1.13		

Int' Mussel Watch - Pesticide & PCB Analysis (nd/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	Total BHCs	Total Chlordane	Total DDTs	"Total" PCBs	g Dry Weight Extd	DryWet %	Lipid (mg/gdw)
NOAA QA	1426	NOMN3	N.D.	N.D.	N.D.	N.D.	1.3		
ILMR Blank 2	1427	BLMN2	N.D.	N.D.	N.D.	N.D.			
ILMR Blank 3	1428	BLMN3	N.D.	N.D.	N.D.	N.D.			
ILMR Blank 4	1429	BLMN4	N.D.	N.D.	N.D.	N.D.			
ILMR Blank 5	1430	BLMN5	N.D.	N.D.	N.D.	N.D.			
ILMR Blank 6	1431	BLMN6	N.D.	N.D.	N.D.	N.D.			
ILMR Blank 7	1432	BLMN7	N.D.	N.D.	N.D.	N.D.			
ILMR Blank 8	1433	BLMN8	N.D.	N.D.	N.D.	N.D.			
NOAA QA74	1434	NOTX1A	N.D.	N.D.	N.D.	N.D.	0.84	0.17	
NOAA QA74	1435	NOTX1B	N.D.	N.D.	N.D.	N.D.	0.64	0.12	35
NOAA QA74	1436	NOTX1C	N.D.	N.D.	N.D.	N.D.	0.66	0.12	28
NOAA QA74	1437	NOTX1D	N.D.	N.D.	N.D.	N.D.	0.61	0.12	46
NOAA QA74	1438	NOTX1E	N.D.	N.D.	N.D.	N.D.	0.71	0.14	39
NOAA QA74	1439	NOTX1F	N.D.	N.D.	N.D.	N.D.	0.56	0.11	41
NOAA QA74	1440	NOTX1G	N.D.	N.D.	N.D.	N.D.	0.81	0.16	10
GERG Blank 7	1441	BLTX7	N.D.	N.D.	N.D.	6.1			
GERG Blank 8	1442	BLTX8	N.D.	N.D.	0.41	5.5			
NOAA QA92	1443	NOTX2A	3.85	48.05	76.07	859.56	0.93	0.08	3.41
NOAA QA92	1444	NOTX2B	4.19	49.95	90.2	944.05	0.92	0.08	4.61
NOAA QA92	1445	NOTX2C	4.09	55.69	88.14	938.77	0.9	0.07	3.09
NOAA QA92	1446	NOTX2D	4.5	50.62	88.68	964.64	0.9	0.07	3.09
NOAA QA92	1447	NOTX2E	4.29	51.29	85.12	953.69	0.9	0.07	3.09
Staten Island	1448	SIMNA	N.D.	N.D.	64.96	N.D.	2		38mg/g
Staten Island	1449	SIMNB					1.25		28mg/g
Staten Island	1450	SIMNC					1.25		28mg/g

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	spike	recov	spike	recov	spike	recov
Laguna Madre	1297	MELM	TXIS Spike DBFOB	27.10%	TXIS Spike PCB103	80.10%	TXIS Spike PCB198	41.60%
Tampico	1293	META	TXIS Spike DBFOB	27.60%	TXIS Spike PCB103	61.40%	TXIS Spike PCB198	47.80%
Laguna de Ostion	1279	MELO	TXIS Spike DBFOB	31.50%	TXIS Spike PCB103	56.20%	TXIS Spike PCB198	50.00%
Laguna de Ostion	1280	MELO	PCB #29 & #209	65%				
Laguna de Términos	1275	MELT	TXIS Spike DBFOB	26.00%	TXIS Spike PCB103	55.60%	TXIS Spike PCB198	47.40%
Belize City	1258	BEBC	PCB #29 & #209	70%				
La Ceiba	1260	HOLC	TXIS Spike DBFOB	40.40%	TXIS Spike PCB103	54.80%	TXIS Spike PCB198	56.90%
Tortuguero	1148	CRTO	TXIS Spike DBFOB	28.80%	TXIS Spike PCB103	51.30%	TXIS Spike PCB198	49.00%
Puerto Almirante	1092	PAPA	TXIS Spike DBFOB	38.00%	TXIS Spike PCB103	48.80%	TXIS Spike PCB198	51.60%
Portobelo	1057	PAPB	TXIS Spike DBFOB	38.90%	TXIS Spike PCB103	52.60%	TXIS Spike PCB198	54.90%
Bahia de Cartagena	1096	COBC	TXIS Spike DBFOB	37.10%	TXIS Spike PCB103	49.40%	TXIS Spike PCB198	54.70%
Bahia de Cartagena	1098	COBC	TXIS Spike DBFOB	24.20%	TXIS Spike PCB103	41.60%	TXIS Spike PCB198	40.00%
Cienaga Grande	1100	COCG	TXIS Spike DBFOB	35.80%	TXIS Spike PCB103	50.30%	TXIS Spike PCB198	52.60%
Cienaga Grande	1102	COCG	PCB #29 & #209	AT:55%				
Commander's Bay	1142	ARCB	TXIS Spike DBFOB	29.30%	TXIS Spike PCB103	47.70%	TXIS Spike PCB198	48.00%
Morrocoy	1122	VEMO	PCB #29 & #209	51%				
Paparo	1116	VEPA	TXIS Spike DBFOB	35.80%	TXIS Spike PCB103	46.80%	TXIS Spike PCB198	48.30%
Cumana	1130	VECU	TXIS Spike DBFOB	29.60%	TXIS Spike PCB103	49.30%	TXIS Spike PCB198	44.00%
Caroni Swamp	1132	TRCS	TXIS Spike DBFOB	39.70%	TXIS Spike PCB103	56.30%	TXIS Spike PCB198	56.40%
Caroni Swamp	1134	TRCS	PCB #29 & #209	74%				
Southern Range	1136A	TRSR	TXIS Spike DBFOB	37.00%	TXIS Spike PCB103	46.70%	TXIS Spike PCB198	51.10%
Southern Range	1136B	TRSR	TXIS Spike DBFOB	36.60%	TXIS Spike PCB103	46.60%	TXIS Spike PCB198	51.40%
Bowden	1267	JABO	TXIS Spike DBFOB	35.00%	TXIS Spike PCB103	59.60%	TXIS Spike PCB198	52.50%

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	spike	recov	spike	recov	spike	recov
Bowden	1268	JABO	PCB #29 & #209	70%				
Port Royal	1272	JAPR	TXIS Spike DBFOB	17.80%	TXIS Spike PCB103	34.50%	TXIS Spike PCB198	30.40%
Cayo Culebra	1313	CUCC	TXIS Spike DBFOB	43.60%	TXIS Spike PCB103	54.60%	TXIS Spike PCB198	56.40%
Cayo Culebra	1314	CUCC	PCB #29 & #209	72%				
Bragança	1182	BRBR	PCB #29 & #209	60%				
Sao Luis	1177	BRSL	TXIS Spike DBFOB	27.40%	TXIS Spike PCB103	50.50%	TXIS Spike PCB198	43.40%
Fortaleza	1171	BRFO	TXIS Spike DBFOB	34.00%	TXIS Spike PCB103	55.50%	TXIS Spike PCB198	51.70%
Fortaleza	1175	BRFO	TXIS Spike DBFOB	24.60%	TXIS Spike PCB103	47.40%	TXIS Spike PCB198	40.30%
Fortaleza	1176	BRFO	PCB #29 & #209	60%				
Recife	1163	BRRE	TXIS Spike DBFOB	32.40%	TXIS Spike PCB103	43.80%	TXIS Spike PCB198	50.30%
Recife	1164	BRRE	PCB #29 & #209	66%				
Recife	1167	BRRE	TXIS Spike DBFOB	35.80%	TXIS Spike PCB103	57.80%	TXIS Spike PCB198	59.30%
Lagoa Mundaú	1170	BRLM	PCB #29 & #209	52%				
Salvador	1159	PABI			TXIS Spike PCB103	48.60%	TXIS Spike PCB198	51.60%
Salvador	1161	BRSA	TXIS Spike DBFOB	24.70%	TXIS Spike PCB103	43.50%	TXIS Spike PCB198	42.20%
Salvador	1162	BRSA	TXIS Spike DBFOB	26.20%	TXIS Spike PCB103	46.80%	TXIS Spike PCB198	43.00%
Vitoria	1183A	BRVI	TXIS Spike DBFOB	21.90%	TXIS Spike PCB103	50.50%	TXIS Spike PCB198	45.70%
Vitoria	1183B	BRVI	TXIS Spike DBFOB	24.60%	TXIS Spike PCB103	53.60%	TXIS Spike PCB198	50.10%
Cabo Frio	1187	BRCF	TXIS Spike DBFOB	37.00%	TXIS Spike PCB103	48.80%	TXIS Spike PCB198	52.80%
Cabo Frio	1190	BRCF	PCB #29 & #209	AT:50%				
Bahía Guanabara	1193	BRGB	TXIS Spike DBFOB	25.40%	TXIS Spike PCB103	45.80%	TXIS Spike PCB198	44.30%
Bahía Guanabara	1194	BRGB	PCB #29 & #209	AT:41%				
Santos	1153	BRSB	TXIS Spike DBFOB	26.20%	TXIS Spike PCB103	48.40%	TXIS Spike PCB198	42.00%
Santos	1154	BRSB	PCB #29 & #209	AT:43%				
Bahía Paranagua	1195	BRPB	TXIS Spike DBFOB	26.00%	TXIS Spike PCB103	58.30%	TXIS Spike PCB198	49.10%

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	spike	recov	spike	recov	spike	recov
Bahia Paranagua	1198	BRPB	PCB #29 & #209	65%				
Lagoa dos Patos	1199	BRLP	TXIS Spike DBFOB	29.10%	TXIS Spike PCB103	49.00%	TXIS Spike PCB198	45.80%
Lagoa dos Patos	1202	BRLP	PCB #29 & #209	AT:51%				
Punta del Este	1014	URPE	PCB #29 & #209	53%				
Santa Lucia	1020	URSL	TXIS Spike DBFOB	29.30%	TXIS Spike PCB103	50.20%	TXIS Spike PCB198	43.50%
Hudson	1002	ARHU	PCB #29 & #209	AT:41%				
Hudson	1004	ARHU	TXIS Spike DBFOB	19.80%	TXIS Spike PCB103	32.60%	TXIS Spike PCB198	35.50%
Atalaya	1008	ARAT	TXIS Spike DBFOB	41.50%	TXIS Spike PCB103	45.30%	TXIS Spike PCB198	52.20%
Mar del Plata	1024	ARMP	TXIS Spike DBFOB	38.60%	TXIS Spike PCB103	52.60%	TXIS Spike PCB198	56.70%
Pehuen-co	1027A	ARPC	TXIS Spike DBFOB	22.30%	TXIS Spike PCB103	41.80%	TXIS Spike PCB198	36.50%
Pehuen-co	1027B	ARPC	TXIS Spike DBFOB	16.70%	TXIS Spike PCB103	34.80%	TXIS Spike PCB198	30.80%
Arroyo Parejas	1029	ARAP	TXIS Spike DBFOB	30.20%	TXIS Spike PCB103	56.90%	TXIS Spike PCB198	56.40%
Rawson	1033	ARRA	TXIS Spike DBFOB	14.40%	TXIS Spike PCB103	29.00%	TXIS Spike PCB198	25.30%
Bahia Camarones	1037	ARCA	TXIS Spike DBFOB	18.60%	TXIS Spike PCB103	34.50%	TXIS Spike PCB198	34.60%
Bahia Camarones	1040	ARCA	TXIS Spike DBFOB	30.60%	TXIS Spike PCB103	63.10%	TXIS Spike PCB198	63.00%
Bahia Camarones	1042	ARCA	PCB #29 & #209	AT:33%				
Bahia Camarones	1043	ARCA	TXIS Spike DBFOB	40.60%	TXIS Spike PCB103	61.70%	TXIS Spike PCB198	65.30%
Punta Loyola	1052	ARPL	TXIS Spike DBFOB	34.00%	TXIS Spike PCB103	55.70%	TXIS Spike PCB198	53.50%
Ushuaia	1046	ARUS	PCB #29 & #209	44%				
Punta Arenas	1209	CHPA	TXIS Spike DBFOB	21.10%	TXIS Spike PCB103	41.80%	TXIS Spike PCB198	45.30%
Punta Arenas	1211	CHPA	TXIS Spike DBFOB	27.00%	TXIS Spike PCB103	48.50%	TXIS Spike PCB198	52.20%
Punta Arenas	1212	CHPA	PCB #29 & #209	60%				
Punta Arenas	1213	CHPA	TXIS Spike DBFOB	27.70%	TXIS Spike PCB103	61.60%	TXIS Spike PCB198	65.90%
Puerto Montt	1203	CHPM	TXIS Spike DBFOB	29.50%	TXIS Spike PCB103	62.20%	TXIS Spike PCB198	47.60%
Puerto Montt	1205	CHPM	TXIS Spike DBFOB	16.90%	TXIS Spike PCB103	32.00%	TXIS Spike PCB198	27.10%

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	spike	recov	spike	recov	spike	recov
Puerto Montt	1206	CHPM	TXIS Spike DBFOB	22.50%	TXIS Spike PCB103	41.60%	TXIS Spike PCB198	38.60%
Puerto Montt	1208	CHPM	PCB #29 & #209	57%				
Concepcion	1229	CHCO	TXIS Spike DBFOB	31.00%	TXIS Spike PCB103	54.10%	TXIS Spike PCB198	52.60%
Concepcion	1231	CHCO	TXIS Spike DBFOB	25.20%	TXIS Spike PCB103	52.60%	TXIS Spike PCB198	52.60%
Concepcion	1234	CHCO	PCB #29 & #209	69%				
Valparaiso	1216	CHVA	PCB #29 & #209	AT:18%				
LA Serena	1217	CHLS	TXIS Spike DBFOB	33.40%	TXIS Spike PCB103	72.80%	TXIS Spike PCB198	60.30%
LA Serena	1218	CHLS	PCB #29 & #209	67%				
Antofagasta	1228	CHAN	PCB #29 & #209	73%				
Arica	1222	CHAR	PCB #29 & #209	60%				
Arica	1225A	CHAR	TXIS Spike DBFOB	30.30%	TXIS Spike PCB103	51.10%	TXIS Spike PCB198	51.10%
Arica	1225B	CHAR	TXIS Spike DBFOB	29.30%	TXIS Spike PCB103	48.70%	TXIS Spike PCB198	48.90%
Paracas	1239	PEPA	TXIS Spike DBFOB	25.60%	TXIS Spike PCB103	55.90%	TXIS Spike PCB198	49.40%
Paracas	1240	PEPA	PCB #29 & #209	57%				
Paracas	1241	PEPA	TXIS Spike DBFOB	19.70%	TXIS Spike PCB103	36.60%	TXIS Spike PCB198	32.30%
Paracas	1242	PEPA	PCB #29 & #209	AT:36%				
Callao	1235A	PECA	TXIS Spike DBFOB	23.60%	TXIS Spike PCB103	40.30%	TXIS Spike PCB198	42.10%
Callao	1235B	PECA	TXIS Spike DBFOB	26.90%	TXIS Spike PCB103	48.50%	TXIS Spike PCB198	48.60%
Guayaquil	1244	ECGU	PCB #29 & #209	74%				
Río Chone	1247	ECCR	TXIS Spike DBFOB	25.70%	TXIS Spike PCB103	55.60%	TXIS Spike PCB198	51.70%
Río Chone	1248	ECCR	PCB #29 & #209	73%				
Río Chone	1249	ECCR	TXIS Spike DBFOB	29.80%	TXIS Spike PCB103	57.10%	TXIS Spike PCB198	56.00%
Bahia Tumaco	1107	COBT	TXIS Spike DBFOB	25.00%	TXIS Spike PCB103	41.30%	TXIS Spike PCB198	39.70%
Bahia Tumaco	1110	COBT	PCB #29 & #209	62%				
Bahia Tumaco	1111	COBT	TXIS Spike DBFOB	20.00%	TXIS Spike PCB103	37.70%	TXIS Spike PCB198	31.30%
Bahia Tumaco	1113	COBT	TXIS Spike DBFOB	40.90%	TXIS Spike PCB103	55.80%	TXIS Spike PCB198	58.30%
Playa Bique	1060	PABI	PCB #29 & #209	48%				
Punta Chame	1064	PAPC	TXIS Spike DBFOB	33.50%	TXIS Spike PCB103	62.20%	TXIS Spike PCB198	59.90%

Site	ID	Code	spike	recov	spike	recov	spike	recov
Golfito	1082	CRGO	TXIS Spike DBFOB	25.30%	TXIS Spike PCB103	46.30%	TXIS Spike PCB198	38.00%
Golfito	1083A	CRGO	TXIS Spike DBFOB	48.40%	TXIS Spike PCB103	69.80%	TXIS Spike PCB198	73.30%
Golfito	1083B	CRGO	TXIS Spike DBFOB	32.40%	TXIS Spike PCB103	47.70%	TXIS Spike PCB198	49.30%
Golfito	1085	CRGO	TXIS Spike DBFOB	39.80%	TXIS Spike PCB103	54.50%	TXIS Spike PCB198	58.00%
Punta Zancudo	1090	CRPZ	PCB #29 & #209	68%				
Estero Jicaral	1072	CREJ	TXIS Spike DBFOB	44.80%	TXIS Spike PCB103	63.10%	TXIS Spike PCB198	63.70%
Isla Paloma	1075	CRIP	TXIS Spike DBFOB	34.00%	TXIS Spike PCB103	62.60%	TXIS Spike PCB198	60.50%
Estero Cocoroca	1077	CREC	TXIS Spike DBFOB	30.60%	TXIS Spike PCB103	51.40%	TXIS Spike PCB198	42.80%
Estero Cocoroca	1078	CREC	PCB #29 & #209	63%				
Estero Cocoroca	1079A	CREC	TXIS Spike DBFOB	28.30%	TXIS Spike PCB103	56.60%	TXIS Spike PCB198	56.10%
Estero Cocoroca	1079B	CREC	TXIS Spike DBFOB	32.50%	TXIS Spike PCB103	60.60%	TXIS Spike PCB198	59.10%
Ostional	1070	NIOS	PCB #29 & #209	49%				
Isla de Aserradores	1066	NIIA	TXIS Spike DBFOB	25.50%	TXIS Spike PCB103	52.20%	TXIS Spike PCB198	47.40%
San Lorenzo	1262	HOGF	TXIS Spike DBFOB	35.60%	TXIS Spike PCB103	48.40%	TXIS Spike PCB198	48.80%
San Lorenzo	1263	HOGF	TXIS Spike DBFOB	23.40%	TXIS Spike PCB103	42.00%	TXIS Spike PCB198	35.00%
Puerto La Union	1252	ESGF	PCB #29 & #209	70%				
La Libertad	1256	ESLL	TXIS Spike DBFOB	25.90%	TXIS Spike PCB103	55.40%	TXIS Spike PCB198	48.50%
Puerto Madero	1292	MEPM	PCB #29 & #209	71%				
Bahia Ventosa	1283	MELV	TXIS Spike DBFOB	29.50%	TXIS Spike PCB103	51.30%	TXIS Spike PCB198	47.20%
Bahia Ventosa	1286	MELV	PCB #29 & #209	71%				
Puerto Escondido	1289	MEPE	TXIS Spike DBFOB	26.50%	TXIS Spike PCB103	57.60%	TXIS Spike PCB198	42.90%
Mazatlan	1309	MEMA	TXIS Spike DBFOB	30.00%	TXIS Spike PCB103	60.10%	TXIS Spike PCB198	55.60%
Altata-Pabellon	1317	MEAP	TXIS Spike DBFOB	27.60%	TXIS Spike PCB103	49.20%	TXIS Spike PCB198	43.30%
Altata-Pabellon	1318	MEAP	PCB #29 & #209	66%				

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	spike	recov	spike	recov	spike	recov
San Felipe	1305	MESF	TXIS Spike DBFOB	25.40%	TXIS Spike PCB103	53.60%	TXIS Spike PCB198	47.30%
San Carlos	1307	MESC	TXIS Spike DBFOB	29.70%	TXIS Spike PCB103	44.40%	TXIS Spike PCB198	45.70%
Ensenada	1303	MEEN	TXIS Spike DBFOB	30.60%	TXIS Spike PCB103	56.50%	TXIS Spike PCB198	55.40%
Ensenada	1304	MEEN	PCB #29 & #209	72%				
Punta Banderas	1301A	MEPB	TXIS Spike DBFOB	30.20%	TXIS Spike PCB103	54.00%	TXIS Spike PCB198	48.60%
Punta Banderas	1301B	MEPB	TXIS Spike DBFOB	26.70%	TXIS Spike PCB103	51.30%	TXIS Spike PCB198	45.30%
Deer Island	1401	DI119						
Deer Island	1402	DI227						
Deer Island	1403	DI530						
Staten Island	1404	SITXA						
Staten Island	1405	SITXB						
Staten Island	1406	SITXC						
GERG Blank	1408	BLTX1						
Deer Island	1409	DI179	MNIS Spike ???	91%				
Deer Island	1410	DI293	PCB #29 & #209	93%				
Deer Island	1411	DI492	PCB #29 & #209	94%				
Unknown	1413	XXMN	MNIS Spike ???	90%				
ILMR Blank NIST	1415	NISTMN	MNIS Spike ???	70%				
ILMR Blank 1	1416	BLMN1	MNIS Spike ???	74%				
GERG Blank 2	1417	BLTX2	TXIS Spike DBFOB	24.70%	TXIS Spike PCB103	47.40%	TXIS Spike PCB198	35.20%
GERG Blank 3	1418	BLTX3	TXIS Spike DBFOB	26.40%	TXIS Spike PCB103	62.30%	TXIS Spike PCB198	41.50%
GERG Blank 4	1419	BLTX4	TXIS Spike DBFOB	35.10%	TXIS Spike PCB103	62.90%	TXIS Spike PCB198	39.90%
GERG Blank 5	1420	BLTX5	TXIS Spike DBFOB	37.60%	TXIS Spike PCB103	57.80%	TXIS Spike PCB198	59.00%
GERG Blank 6	1421	BLTX6	TXIS Spike DBFOB	38.70%	TXIS Spike PCB103	54.40%	TXIS Spike PCB198	56.50%
NOAA QA	1422	NOMN1A						
NOAA QA	1423	NOMN1B						
NOAA QA	1424	NOMN1C						
NOAA QA	1425	NOMN2						

Site	ID	Code	spike	recov	spike	recov	spike	recov
NOAA QA	1426	NOMN3						
ILMR Blank 2	1427	BLMN2	MNIS Spike ???	66%				
ILMR Blank 3	1428	BLMN3	MNIS Spike ???	55%				
ILMR Blank 4	1429	BLMN4	MNIS Spike ???	AT:41%				
ILMR Blank 5	1430	BLMN5	MNIS Spike ???	88%				
ILMR Blank 6	1431	BLMN6	MNIS Spike ???	70%				
ILMR Blank 7	1432	BLMN7	MNIS Spike ???	84%				
ILMR Blank 8	1433	BLMN8	MNIS Spike ???	66%				
NOAA QA74	1434	NOTX1A	TXIS Spike DBFOB	29.00%	TXIS Spike PCB103	52.00%	TXIS Spike PCB198	48.50%
NOAA QA74	1435	NOTX1B	TXIS Spike DBFOB	26.80%	TXIS Spike PCB103	60.30%	TXIS Spike PCB198	53.30%
NOAA QA74	1436	NOTX1C	TXIS Spike DBFOB	34.50%	TXIS Spike PCB103	56.80%	TXIS Spike PCB198	55.10%
NOAA QA74	1437	NOTX1D	TXIS Spike DBFOB	39.30%	TXIS Spike PCB103	54.10%	TXIS Spike PCB198	58.10%
NOAA QA74	1438	NOTX1E	TXIS Spike DBFOB	33.50%	TXIS Spike PCB103	47.00%	TXIS Spike PCB198	49.00%
NOAA QA74	1439	NOTX1F	TXIS Spike DBFOB	22.90%	TXIS Spike PCB103	41.70%	TXIS Spike PCB198	40.50%
NOAA QA74	1440	NOTX1G	TXIS Spike DBFOB	27.50%	TXIS Spike PCB103	48.30%	TXIS Spike PCB198	45.40%
GERG Blank 7	1441	BLTX7	TXIS Spike DBFOB	25.00%	TXIS Spike PCB103	46.90%	TXIS Spike PCB198	30.90%
GERG Blank 8	1442	BLTX8	TXIS Spike DBFOB	20.60%	TXIS Spike PCB103	40.00%	TXIS Spike PCB198	23.60%
NOAA QA92	1443	NOTX2A	TXIS Spike DBFOB	69.40%	TXIS Spike PCB103	75.80%	TXIS Spike PCB198	75.70%
NOAA QA92	1444	NOTX2B	TXIS Spike DBFOB	65.60%	TXIS Spike PCB103	70.20%	TXIS Spike PCB198	70.80%
NOAA QA92	1445	NOTX2C	TXIS Spike DBFOB	61.90%	TXIS Spike PCB103	69.50%	TXIS Spike PCB198	66.50%
NOAA QA92	1446	NOTX2D	TXIS Spike DBFOB	60.70%	TXIS Spike PCB103	65.80%	TXIS Spike PCB198	64.20%
NOAA QA92	1447	NOTX2E	TXIS Spike DBFOB	60.80%	TXIS Spike PCB103	67.10%	TXIS Spike PCB198	64.90%
Staten Island	1448	SIMNA	PCB #29 & #209	68%				
Staten Island	1449	SIMNB	PCB #29 & #209	69%				
Staten Island	1450	SIMNC	PCB #29 & #209	82%				

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	HexaClB	Alpha HCH	Beta HCH	Lindane HCH	Delta HCH	Hepta chlor	Hept Epoxid	Oxychl ordane	Gamma Chlordane (Trans)	Alpha Chlordane (Cis)	Trans Nona chlor
Laguna Madre	1297	MELM	1.24	N.D.	5.06	1.08	7.28	N.D.	3.41	1.19	2.65	2.53	2.72
Tampico	1293	META	Tr	N.D.	N.D.	0.41	N.D.	0.75	0.26	N.D.	0.84	9.53	1.24
Laguna de Ostion	1279	MELO	Tr	N.D.	N.D.	0.56	N.D.	N.D.	N.D.	0.91	0.44	2.4	0.71
Laguna de Ostion	1280	MELO	1.47	Tr	Tr	0.38	N.D.	Tr	<0.01	N.D.	0.39	Tr	0.25
Laguna de Términos	1275	MELT	N.D.	N.D.	Tr	0.29	N.D.	N.D.	N.D.	N.D.	N.D.	1.98	Tr
Belize City	1258	BEBC	Tr	Tr	Tr	0.36	N.D.	Tr	Tr	N.D.	0.49	0.61	0.9
La Ceiba	1260	HOLC	Tr	N.D.	Tr	0.28	N.D.	N.D.	N.D.	N.D.	Tr	0.28	Tr
Tortuguero	1148	CRTO	N.D.	N.D.	0.36	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.46	0.8
Puerto Almirante	1092	PAPA	N.D.	N.D.	Tr	Tr	Tr	N.D.	N.D.	0.58	0.81	1.06	2.58
Portobelo	1057	PAPB	Tr	N.D.	Tr	0.41	0.61	Tr	N.D.	Tr	0.48	0.58	0.65
Bahia de Cartagena	1096	COBC	N.D.	N.D.	Tr	0.51	N.D.	N.D.	Tr	Tr	Tr	0.38	Tr
Bahia de Cartagena	1098	COBC	N.D.	0.41	Tr	0.38	N.D.	N.D.	N.D.	Tr	Tr	0.57	0.27
Cienaga Grande	1100	COCG	Tr	N.D.	0.72	N.D.	N.D.	Tr	N.D.	Tr	0.28	1.07	0.85
Cienaga Grande	1102	COCG	0.6	Tr	Tr	1.54	N.D.	0.36	<0.01	N.D.	2.07	0.55	0.6
Commander's Bay	1142	ARCB	N.D.	N.D.	N.D.	0.53	N.D.	N.D.	Tr	0.29	0.81	1.61	1.44
Morrocoy	1122	VEMO	0.48	0.44	Tr	2.45	N.D.	0.42	<0.01	N.D.	0.85	Tr	Tr
Paparo	1116	VEPA	N.D.	N.D.	Tr	0.3	N.D.	Tr	N.D.	Tr	Tr	Tr	Tr
Cumana	1130	VECU	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	0.28	N.D.	0.26	0.31	Tr
Caroni Swamp	1132	TRCS	N.D.	N.D.	0.33	0.47	N.D.	0.28	N.D.	N.D.	0.7	0.84	0.44
Caroni Swamp	1134	TRCS	0.86	1.33	Tr	7.2	N.D.	0.53	Tr	N.D.	5.94	0.9	0.4
Southern Range	1136A	TRSR	Tr	N.D.	Tr	0.85	N.D.	N.D.	N.D.	Tr	Tr	0.43	Tr
Southern Range	1136B	TRSR	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Bowden	1267	JABO	Tr	N.D.	0.65	N.D.	0.3	N.D.	N.D.	N.D.	0.33	0.53	0.35

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	HexaClB	Alpha HCH	Beta HCH	Lindane HCH	Delta HCH	Hepta chlor	Hept Epoxid	Oxychl ordane	Gamma Chlordane (Trans)	Alpha Chlordane (Cis)	Trans Nona chlor
Bowden	1268	JABO	0.83	Tr	Tr	0.27	N.D.	Tr	<0.01	N.D.	Tr	Tr	Tr
Port Royal	1272	JAPR	N.D.	0.72	1.14	1.08	0.49	1.4	N.D.	0.64	N.D.	1.25	3.1
Cayo Culebra	1313	CUCC	N.D.	N.D.	0.42	0.66	N.D.	N.D.	Tr	Tr	N.D.	0.79	Tr
Cayo Culebra	1314	CUCC	Tr	<0.01	<0.01	Tr	N.D.	Tr	Tr	N.D.	<0.01	Tr	Tr
Bragança	1182	BRBR	0.27	<0.01	<0.01	Tr	N.D.	Tr	0.76	N.D.	Tr	Tr	<0.01
Sao Luis	1177	BRSL	Tr	N.D.	N.D.	1.75	Tr	N.D.	N.D.	0.43	0.25	0.71	Tr
Fortaleza	1171	BRFO	Tr	N.D.	N.D.	2.83	Tr	0.55	0.35	0.38	0.96	2.05	0.3
Fortaleza	1175	BRFO	Tr	N.D.	0.37	0.99	0.8	N.D.	N.D.	0.86	0.84	0.88	0.43
Fortaleza	1176	BRFO	0.42	0.25	Tr	0.44	N.D.	Tr	<0.01	N.D.	0.29	Tr	Tr
Recife	1163	BRRE	Tr	0.35	0.54	0.39	N.D.	Tr	Tr	0.58	2.92	1	0.35
Recife	1164	BRRE	Tr	Tr	Tr	Tr	N.D.	0.52	0.26	N.D.	1.26	Tr	0.26
Recife	1167	BRRE	Tr	0.86	N.D.	1.84	0.61	0.49	0.63	1.53	6.79	1.59	0.67
Lagoa Mundaú	1170	BRLM	0.28	Tr	0.76	0.37	N.D.	Tr	1.93	N.D.	1.01	0.3	Tr
Salvador	1159	PABI	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	N.D.	N.D.	N.D.
Salvador	1161	BRSA	Tr	N.D.	0.91	0.43	0.87	0.32	N.D.	N.D.	0.64	1.92	N.D.
Salvador	1162	BRSA	Tr	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	N.D.	Tr	1.9	Tr
Vitoria	1183A	BRVI	0.31	N.D.	3.83	0.34	1.97	0.82	N.D.	0.44	1.45	2.85	0.64
Vitoria	1183B	BRVI	0.25	N.D.	3.83	0.26	1.72	0.79	N.D.	0.64	1.62	3.37	0.53
Cabo Frio	1187	BRCF	Tr	N.D.	0.88	0.7	N.D.	0.28	Tr	Tr	N.D.	1.04	N.D.
Cabo Frio	1190	BRCF	Tr	Tr	0.71	Tr	N.D.	Tr	1.86	N.D.	Tr	Tr	<0.01
Bahía Guanabara	1193	BRGB	N.D.	1.33	23.68	2.05	2.44	Tr	0.7	2.11	12.58	1.72	0.49
Bahía Guanabara	1194	BRGB	0.76	0.65	27.8	2.01	N.D.	Tr	0.91	N.D.	2.2	1.18	0.6
Santos	1153	BRSB	14.29	5.78	60.34	2.37	27.28	0.26	0.65	0.53	5.21	6.38	0.64
Santos	1154	BRSB	8.32	3.85	50.5	0.55	N.D.	0.26	1.03	N.D.	0.94	0.92	0.35
Bahía Paranagua	1195	BRPB	N.D.	N.D.	0.32	N.D.	N.D.	0.29	N.D.	N.D.	N.D.	0.26	N.D.

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Site	ID	Code	HexaClB	Alpha HCH	Beta HCH	Lindane HCH	Delta HCH	Hepta chlor	Hept Epoxid	Oxychl ordane	Gamma Chlordane (Trans)	Alpha Chlordane (Cis)	Trans Nona chlor
Bahía Paranagua	1198	BRPB	0.55	0.33	2.69	0.5	N.D.	Tr	<0.01	N.D.	Tr	0.78	<0.01
Lagoa dos Patos	1199	BRLP	Tr	N.D.	0.47	N.D.	Tr	0.46	Tr	Tr	0.39	2.39	0.28
Lagoa dos Patos	1202	BRLP	0.45	Tr	1.25	0.53	N.D.	Tr	Tr	N.D.	Tr	Tr	<0.01
Punta del Este	1014	URPE	0.6	Tr	Tr	1.7	N.D.	0.45	0.42	N.D.	2.9	3	1.1
Santa Lucia	1020	URSL	0.51	2.51	N.D.	N.D.	1.84	N.D.	N.D.	1.17	1.53	4.23	1.79
Hudson	1002	ARHU	2.1	0.25	11	25	N.D.	6.3	23	N.D.	170	34	50
Hudson	1004	ARHU	2.71	N.D.	6.65	19.15	N.D.	8.21	43.49	8.94	306.54	79.17	52.51
Atalaya	1008	ARAT	N.D.	0.83	2.31	6.5	N.D.	N.D.	2.34	1.17	32.52	12.79	7.38
Mar del Plata	1024	ARMP	Tr	0.35	0.4	N.D.	0.34	0.5	N.D.	Tr	0.53	0.49	0.42
Pehuen-co	1027A	ARPC	Tr	1.63	0.7	3.42	Tr	0.52	0.53	0.4	1.26	3.63	0.71
Pehuen-co	1027B	ARPC	Tr	1.68	0.59	4.09	0.35	0.83	0.76	0.51	1.39	4.51	1.06
Arroyo Parejas	1029	ARAP	N.D.	0.95	0.69	6.31	N.D.	N.D.	1.2	0.91	6.86	3.6	2.99
Rawson	1033	ARRA	Tr	N.D.	N.D.	6.02	0.96	0.69	0.25	Tr	0.54	0.61	0.58
Bahia Camarones	1037	ARCA	0.28	N.D.	N.D.	N.D.	N.D.	N.D.	0.34	N.D.	N.D.	1.96	0.42
Bahia Camarones	1040	ARCA	Tr	N.D.	Tr	0.33	N.D.	N.D.	N.D.	N.D.	0.69	N.D.	Tr
Bahia Camarones	1042	ARCA	0.88	<0.01	Tr	1.5	N.D.	0.66	0.41	N.D.	1.4	1.1	Tr
Bahia Camarones	1043	ARCA	0.45	1.28	1.07	1.36	1.14	1.1	0.86	1.47	1.06	1.95	1.5
Punta Loyola	1052	ARPL	1.36	N.D.	0.4	1.52	0.73	1.08	0.4	0.67	0.84	0.46	0.91
Ushuaia	1046	ARUS	0.99	0.28	Tr	2.1	N.D.	0.68	<0.01	N.D.	1.8	0.7	Tr
Punta Arenas	1209	CHPA	0.41	N.D.	4.22	5.15	N.D.	N.D.	N.D.	0.76	0.52	1.06	Tr
Punta Arenas	1211	CHPA	Tr	N.D.	2.75	3.48	N.D.	N.D.	N.D.	0.55	0.31	1.11	Tr
Punta Arenas	1212	CHPA	0.91	1.76	2.98	5.58	N.D.	Tr	0.65	N.D.	Tr	0.36	Tr
Punta Arenas	1213	CHPA	0.34	N.D.	3.84	3.25	N.D.	Tr	N.D.	0.62	2.54	1.52	Tr
Puerto Montt	1203	CHPM	N.D.	N.D.	0.63	0.38	N.D.	N.D.	N.D.	N.D.	N.D.	0.55	Tr
Puerto Montt	1205	CHPM	N.D.	N.D.	1.47	N.D.	N.D.	0.84	N.D.	0.26	2.76	0.82	0.97

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Site	ID	Code	HexaClB	Alpha HCH	Beta HCH	Lindane HCH	Delta HCH	Hepta chlor	Hept Epoxid	Oxychl ordane	Gamma Chlordane (Trans)	Alpha Chlordane (Cis)	Trans Nona chlor
Puerto Montt	1206	CHPM	0.29	N.D.	0.46	N.D.	N.D.	N.D.	Tr	Tr	N.D.	Tr	0.32
Puerto Montt	1208	CHPM	0.78	0.42	1.07	0.66	N.D.	Tr	0.28	N.D.	Tr	0.44	Tr
Concepcion	1229	CHCO	N.D.	N.D.	1.9	1.08	N.D.	Tr	Tr	0.28	N.D.	0.69	0.36
Concepcion	1231	CHCO	N.D.	N.D.	5.05	Tr	Tr	N.D.	N.D.	N.D.	N.D.	0.44	0.28
Concepcion	1234	CHCO	0.77	0.62	0.4	0.49	N.D.	Tr	0.76	N.D.	<0.01	0.65	<0.01
Valparaiso	1216	CHVA	0.59	1.69	1.14	3.97	N.D.	Tr	0.75	N.D.	0.51	0.57	0.26
LA Serena	1217	CHLS	Tr	N.D.	N.D.	N.D.	0.41	4.96	N.D.	Tr	N.D.	N.D.	N.D.
LA Serena	1218	CHLS	0.41	1.31	1.13	Tr	N.D.	Tr	Tr	N.D.	<0.01	0.37	Tr
Antofagasta	1228	CHAN	0.4	0.32	0.45	0.64	N.D.	Tr	1.25	N.D.	<0.01	Tr	<0.01
Arica	1222	CHAR	0.48	0.45	Tr	0.66	N.D.	<0.01	Tr	N.D.	Tr	Tr	Tr
Arica	1225A	CHAR	Tr	N.D.	N.D.	0.83	N.D.	Tr	N.D.	0.53	N.D.	1.74	N.D.
Arica	1225B	CHAR	Tr	N.D.	Tr	0.5	N.D.	Tr	N.D.	0.71	N.D.	1.26	N.D.
Paracas	1239	PEPA	N.D.	N.D.	N.D.	N.D.	N.D.	0.26	N.D.	1.8	N.D.	0.31	Tr
Paracas	1240	PEPA	0.3	0.63	Tr	0.51	N.D.	Tr	0.34	N.D.	<0.01	0.64	Tr
Paracas	1241	PEPA	Tr	N.D.	0.29	N.D.	0.45	0.55	N.D.	N.D.	N.D.	0.45	0.34
Paracas	1242	PEPA	0.33	0.33	Tr	0.46	N.D.	Tr	0.99	N.D.	Tr	Tr	Tr
Callao	1235A	PECA	N.D.	N.D.	Tr	Tr	N.D.	N.D.	N.D.	0.33	0.41	0.37	Tr
Callao	1235B	PECA	N.D.	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	Tr	0.41	0.48	0.27
Guayaquil	1244	ECGU	0.36	0.42	0.32	3.05	N.D.	Tr	0.27	N.D.	0.71	1.12	0.92
Río Chone	1247	ECCR	0.34	N.D.	0.46	Tr	N.D.	N.D.	0.92	N.D.	0.87	0.44	N.D.
Río Chone	1248	ECCR	Tr	Tr	Tr	0.38	N.D.	Tr	Tr	N.D.	<0.01	<0.01	Tr
Río Chone	1249	ECCR	Tr	N.D.	Tr	0.64	N.D.	Tr	N.D.	N.D.	N.D.	N.D.	N.D.
Bahia Tumaco	1107	COBT	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	0.38	Tr
Bahia Tumaco	1110	COBT	0.27	0.33	Tr	2.4	N.D.	Tr	Tr	N.D.	1.8	0.37	Tr
Bahia Tumaco	1111	COBT	N.D.	N.D.	N.D.	0.71	N.D.	N.D.	N.D.	0.5	0.51	0.42	N.D.
Bahia Tumaco	1113	COBT	N.D.	N.D.	Tr	Tr	0.44	N.D.	N.D.	N.D.	0.32	0.41	N.D.
Playa Bique	1060	PABI	0.75	0.72	Tr	4.2	N.D.	0.61	<0.01	N.D.	2.2	0.84	0.56
Punta Chame	1064	PAPC	N.D.	N.D.	Tr	0.42	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	HexaClB	Alpha HCH	Beta HCH	Lindane HCH	Delta HCH	Hepta chlor	Hept Epoxid	Oxychl ordane	Gamma Chlordane (Trans)	Alpha Chlordane (Cis)	Trans Nona chlor
Golfito	1082	CRGO	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Golfito	1083A	CRGO	Tr	Tr	Tr	0.3	Tr	Tr	Tr	Tr	0.62	0.54	0.32
Golfito	1083B	CRGO	Tr	Tr	Tr	0.54	0.26	N.D.	N.D.	N.D.	0.56	0.7	0.32
Golfito	1085	CRGO	Tr	N.D.	0.35	0.54	0.46	N.D.	0.83	N.D.	3.66	1.06	Tr
Punta Zancudo	1090	CRPZ	0.45	Tr	Tr	1.28	N.D.	Tr	0.5	N.D.	4.1	1.37	0.64
Estero Jicaral	1072	CREJ	N.D.	N.D.	Tr	0.34	N.D.	N.D.	Tr	N.D.	Tr	Tr	Tr
Isla Paloma	1075	CRIP	N.D.	N.D.	Tr	1.24	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	N.D.
Estero Cocoroca	1077	CREC	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	1.22	0.31	0.27
Estero Cocoroca	1078	CREC	0.47	Tr	Tr	0.95	N.D.	Tr	<0.01	N.D.	1.8	0.45	Tr
Estero Cocoroca	1079A	CREC	0.89	N.D.	N.D.	Tr	2.65	N.D.	Tr	N.D.	1.65	0.37	N.D.
Estero Cocoroca	1079B	CREC	Tr	N.D.	N.D.	N.D.	2.7	N.D.	N.D.	N.D.	1.43	0.43	N.D.
Ostional	1070	NIOS	0.45	Tr	Tr	1.4	N.D.	0.29	<0.01	N.D.	1.1	0.32	Tr
Isla de Aserradores	1066	NIIA	N.D.	N.D.	N.D.	2.52	N.D.	0.49	1.26	N.D.	0.38	7.91	1.9
San Lorenzo	1262	HOGF	N.D.	N.D.	Tr	0.33	Tr	N.D.	N.D.	N.D.	Tr	0.46	N.D.
San Lorenzo	1263	HOGF	N.D.	N.D.	N.D.	N.D.	N.D.	0.42	N.D.	N.D.	N.D.	0.29	N.D.
Puerto La Union	1252	ESGF	Tr	Tr	Tr	Tr	N.D.	Tr	Tr	N.D.	Tr	Tr	Tr
La Libertad	1256	ESLL	Tr	N.D.	0.41	0.54	N.D.	N.D.	Tr	N.D.	0.3	2.57	N.D.
Puerto Madero	1292	MEPM	0.28	Tr	Tr	Tr	N.D.	Tr	Tr	N.D.	<0.01	Tr	Tr
Bahia Ventosa	1283	MELV	Tr	1.16	N.D.	Tr	N.D.	N.D.	N.D.	0.37	N.D.	1.92	Tr
Bahia Ventosa	1286	MELV	0.27	Tr	Tr	Tr	N.D.	Tr	Tr	Tr	<0.01	Tr	Tr
Puerto Escondido	1289	MEPE	Tr	N.D.	0.45	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	1.16	N.D.
Mazatlan	1309	MEMA	I.N.T.	N.D.	0.66	N.D.	1.21	N.D.	5.19	N.D.	N.D.	0.79	N.D.
Altata-Pabellon	1317	MEAP	N.D.	1.1	3.39	1.38	N.D.	N.D.	N.D.	0.31	1.35	1.03	0.77
Altata-Pabellon	1318	MEAP	0.71	0.33	5.39	0.88	N.D.	Tr	0.36	N.D.	0.69	Tr	0.77

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	HexaClB	Alpha HCH	Beta HCH	Lindane HCH	Delta HCH	Hepta chlor	Hept Epoxid	Oxychl ordane	Gamma Chlordane (Trans)	Alpha Chlordane (Cis)	Trans Nona chlor
San Felipe	1305	MESF	Tr	N.D.	N.D.	N.D.	Tr	N.D.	0.51	N.D.	0.33	4.91	0.35
San Carlos	1307	MESC	Tr	Tr	0.64	N.D.	N.D.	N.D.	N.D.	1.11	Tr	0.67	0.59
Ensenada	1303	MEEN	Tr	0.66	0.51	0.86	N.D.	N.D.	N.D.	0.94	3.7	4	3.26
Ensenada	1304	MEEN	0.28	0.62	0.33	0.32	N.D.	Tr	<0.01	N.D.	1.06	2.07	0.77
Punta Banderas	1301A	MEPB	0.42	3.82	1.08	1.65	N.D.	0.28	Tr	Tr	3.92	4.31	4.88
Punta Banderas	1301B	MEPB	0.42	3.69	1.07	1.83	N.D.	0.26	0.26	0.26	4.24	4.47	5.16
Deer Island	1401	DI119	N.D.	N.D.	N.D.	Tr	2.15	0.58	0.58	2.74	16.85	17.59	21.84
Deer Island	1402	DI227	Tr	N.D.	N.D.	0.6	2.16	0.69	0.48	2.54	21.82	23.42	28.63
Deer Island	1403	DI530	Tr	N.D.	N.D.	0.49	2.15	0.54	0.65	4.06	21.2	22.46	27.16
Staten Island	1404	SITXA	Tr	N.D.	0.62	2.49	N.D.	0.65	1.42	3.18	25.44	29.36	27.06
Staten Island	1405	SITXB	Tr	N.D.	0.71	2.36	N.D.	0.83	1.34	3.23	24.17	27.25	25.16
Staten Island	1406	SITXC	Tr	N.D.	0.6	2.46	N.D.	0.45	1.61	3.26	26.76	29.6	28.71
GERG Blank	1408	BLTX1	Tr	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	Tr	Tr	Tr
Deer Island	1409	DI179	0.39	0.99	Tr	0.58	N.D.	0.53	0.57	N.D.	22.7	28.5	25.6
Deer Island	1410	DI293	0.58	0.84	Tr	0.54	N.D.	1.29	0.87	N.D.	16.1	17.6	23.5
Deer Island	1411	DI492	0.45	1.02	Tr	0.5	N.D.	N.D.	0.61	N.D.	25.8	33	21.1
Unknown	1413	XXMN	Tr	0.33	N.D.	0.35	N.D.	N.D.	1.45	N.D.	11.3	18.8	31.8
ILMR Blank NIST	1415	NISTMN	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 1	1416	BLMN1	N.D.	N.D.	N.D.	320	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
GERG Blank 2	1417	BLTX2	Tr	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	Tr	Tr
GERG Blank 3	1418	BLTX3	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	Tr	Tr
GERG Blank 4	1419	BLTX4	Tr	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	Tr	Tr
GERG Blank 5	1420	BLTX5	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.29	Tr	Tr
GERG Blank 6	1421	BLTX6	Tr	Tr	Tr	Tr	Tr	N.D.	N.D.	Tr	Tr	Tr	Tr
NOAA QA	1422	NOMN1A	N.D.	N.D.	N.D.	4.25	N.D.	0.33	Tr	N.D.	N.D.	7.47	4.75
NOAA QA	1423	NOMN1B	N.D.	N.D.	N.D.	3.53	N.D.	0.29	Tr	N.D.	N.D.	6.27	4.08
NOAA QA	1424	NOMN1C	N.D.	N.D.	N.D.	4.16	N.D.	0.29	Tr	N.D.	N.D.	7.17	4.54
NOAA QA	1425	NOMN2	N.D.	N.D.	N.D.	3.64	N.D.	0.35	Tr	N.D.	N.D.	6.92	4.72

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	HexaClB	Alpha HCH	Beta HCH	Lindane HCH	Delta HCH	Hepta chlor	Hept Epoxid	Oxychl ordane	Gamma Chlordane (Trans)	Alpha Chlordane (Cis)	Trans Nona chlor
NOAA QA	1426	NOMN3	N.D.	N.D.	N.D.	3.86	N.D.	0.33	0.25	N.D.	N.D.	8.02	6.55
ILMR Blank 2	1427	BLMN2	N.D.	N.D.	N.D.	270	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 3	1428	BLMN3	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 4	1429	BLMN4	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 5	1430	BLMN5	49	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 6	1431	BLMN6	78	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 7	1432	BLMN7	86	N.D.	N.D.	230	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 8	1433	BLMN8	N.D.	N.D.	N.D.	291	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
NOAA QA74	1434	NOTX1A	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	28.2	21.9
NOAA QA74	1435	NOTX1B	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	20.7	18.1
NOAA QA74	1436	NOTX1C	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	20.9	16.6
NOAA QA74	1437	NOTX1D	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	18	22.1
NOAA QA74	1438	NOTX1E	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	26.7	20.8
NOAA QA74	1439	NOTX1F	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	25.2	21.3
NOAA QA74	1440	NOTX1G	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	27.4	23.3
GERG Blank 7	1441	BLTX7	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.42	N.D.	Tr
GERG Blank 8	1442	BLTX8	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.25	Tr
NOAA QA92	1443	NOTX2A	Tr	2.5	N.D.	0.52	0.83	N.D.	0.26	4.22	10.17	14.97	11.21
NOAA QA92	1444	NOTX2B	Tr	2.4	N.D.	0.56	1.23	N.D.	0.49	4.63	10.52	15.39	10.64
NOAA QA92	1445	NOTX2C	Tr	2.45	N.D.	0.61	1.03	N.D.	0.65	4.72	10.66	16.59	13.43
NOAA QA92	1446	NOTX2D	Tr	3.04	N.D.	0.56	0.91	N.D.	0.44	4.76	10.61	14.22	12.04
NOAA QA92	1447	NOTX2E	Tr	2.8	N.D.	0.6	0.89	N.D.	0.51	4.65	11.53	15.91	11.23
Staten Island	1448	SIMNA	0.4	0.39	N.D.	3.42	N.D.	0.37	0.39	N.D.	10.9	13.7	8.41
Staten Island	1449	SIMNB	0.3	0.29	N.D.	3.54	N.D.	0.28	0.68	N.D.	4.44	5.99	9.36
Staten Island	1450	SIMNC	0.3	0.28	N.D.	3.47	N.D.	0.28	0.58	N.D.	4.48	5.94	9.45

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	Cis Nonachlor	Methoxychlor	Aldrin	Dieldrin	Endrin	Mirex	2 4 DDE O P DDE	4 4 DDE P P DDE	2 4 DDD O P DDD	4 4 DDD P P DDD	2 4 DDT O P DDT	4 4 DDT P P DDT
Laguna Madre	1297	MELM	1.59	N.D.	N.D.	N.D.	1.54	3.09	N.D.	7.72	N.D.	2.34	N.D.	4.41
Tampico	1293	META	1.14	N.D.	0.82	N.D.	N.D.	Tr	N.D.	71.34	1.28	29.93	N.D.	9.7
Laguna de Ostion	1279	MELO	0.87	N.D.	N.D.	N.D.	N.D.	Tr	1.09	117.85	1.83	40.49	N.D.	5.03
Laguna de Ostion	1280	MELO	N.D.	0.74	Tr	Tr	Tr	N.D.	0.8	52.6	14.6	31.3	Tr	11
Laguna de Términos	1275	MELT	0.5	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	13.08	Tr	8.53	N.D.	2.71
Belize City	1258	BEBC	N.D.	1.22	<0.01	1.4	0.34	N.D.	0.63	34.1	4.34	11.3	<0.01	9.5
La Ceiba	1260	HOLC	Tr	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	3.24	Tr	2.09	N.D.	1.71
Tortuguero	1148	CRTO	N.D.	N.D.	1.76	3.99	1.29	0.32	N.D.	3.24	0.3	3.61	0.82	6.67
Puerto Almirante	1092	PAPA	1.18	N.D.	N.D.	INT.	1.4	Tr	Tr	11.37	0.58	8.07	0.41	4.09
Portobelo	1057	PAPB	0.4	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	1.36	N.D.	0.9	N.D.	2.32
Bahia de Cartagena	1096	COBC	0.38	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	1.54	N.D.	0.58	Tr	N.D.
Bahia de Cartagena	1098	COBC	Tr	N.D.	N.D.	N.D.	N.D.	N.D.	Tr	2.99	Tr	1.02	N.D.	0.42
Cienaga Grande	1100	COCG	0.35	N.D.	Tr	N.D.	N.D.	Tr	N.D.	5.44	N.D.	0.85	N.D.	0.88
Cienaga Grande	1102	COCG	N.D.	<0.09	Tr	<0.01	<0.02	N.D.	Tr	4.93	0.39	0.76	<0.01	1.18
Commander's Bay	1142	ARCB	2.31	N.D.	N.D.	1.01	N.D.	N.D.	N.D.	3.41	0.85	5.24	1.8	1.53
Morrocoy	1122	VEMO	N.D.	<0.09	0.55	<0.01	<0.02	N.D.	<0.02	Tr	0.46	0.25	<0.01	<0.03
Paparo	1116	VEPA	0.42	N.D.	N.D.	N.D.	Tr	Tr	N.D.	1.6	Tr	1.18	0.81	Tr
Cumana	1130	VECU	Tr	N.D.	Tr	N.D.	N.D.	Tr	N.D.	2.34	Tr	0.96	N.D.	0.52
Caroni Swamp	1132	TRCS	Tr	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	2.47	N.D.	1.59	N.D.	N.D.
Caroni Swamp	1134	TRCS	N.D.	<0.09	Tr	Tr	2	N.D.	0.28	2.92	0.35	3.18	<0.01	<0.03
Southern Range	1136A	TRSR	Tr	N.D.	N.D.	N.D.	0.57	0.74	N.D.	N.D.	N.D.	0.47	N.D.	N.D.
Southern Range	1136B	TRSR	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Bowden	1267	JABO	Tr	N.D.	N.D.	N.D.	0.34	Tr	0.52	3.01	Tr	0.89	Tr	0.83

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Site	ID	Code	Cis Nonachlor	Methoxychlor	Aldrin	Dieldrin	Endrin	Mirex	2 4 DDE O P DDE	4 4 DDE P P DDE	2 4 DDD O P DDD	4 4 DDD P P DDD	2 4 DDT O P DDT	4 4 DDT P P DDT
Bowden	1268	JABO	N.D.	2.94	Tr	Tr	Tr	N.D.	Tr	4.9	Tr	0.97	<0.01	1.15
Port Royal	1272	JAPR	1.49	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	9.16	N.D.	10.15	N.D.	4.71
Cayo Culebra	1313	CUCC	2.77	N.D.	Tr	N.D.	2.64	N.D.	Tr	1.18	N.D.	0.73	N.D.	0.38
Cayo Culebra	1314	CUCC	N.D.	<0.09	<0.01	Tr	<0.02	N.D.	<0.02	1.7	<0.02	Tr	Tr	Tr
Bragança	1182	BRBR	N.D.	<0.09	Tr	Tr	<0.02	N.D.	<0.02	1.12	0.29	1.47	<0.01	0.51
Sao Luis	1177	BRSL	N.D.	N.D.	Tr	1.56	N.D.	Tr	N.D.	28.99	2.03	25.67	0.45	5.03
Fortaleza	1171	BRFO	0.58	N.D.	1.34	N.D.	Tr	0.48	N.D.	7.77	Tr	3.44	N.D.	1.58
Fortaleza	1175	BRFO	0.45	N.D.	0.32	2.17	N.D.	0.37	N.D.	48.96	2.28	36.45	N.D.	5.87
Fortaleza	1176	BRFO	N.D.	0.27	<0.01	Tr	0.25	N.D.	0.35	51.9	9.08	103	<0.01	10.6
Recife	1163	BRRE	0.42	N.D.	0.67	1.52	0.5	3.08	Tr	51.06	2.96	20.33	2.58	N.D.
Recife	1164	BRRE	N.D.	1.13	Tr	1.41	0.27	N.D.	<0.02	17	2.3	13.3	<0.01	<0.03
Recife	1167	BRRE	0.91	N.D.	0.52	4.88	0.47	1.33	1.35	77.59	2.79	40.43	N.D.	0.87
Lagoa Mundaú	1170	BRLM	N.D.	<0.09	<0.01	1.86	<0.02	N.D.	0.49	64.8	1.14	13.8	<0.01	0.41
Salvador	1159	PABI	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Salvador	1161	BRSA	N.D.	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	9.18	Tr	4.36	N.D.	1.22
Salvador	1162	BRSA	0.33	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	4.66	N.D.	3.34	N.D.	0.92
Vitoria	1183A	BRVI	0.98	N.D.	N.D.	1.92 •	N.D.	2.22	N.D.	11.01	1.74	13.7	0.67	5.39
Vitoria	1183B	BRVI	1	N.D.	N.D.	2.26	N.D.	2.35	N.D.	10.71	1.59	13.42	0.7	5.16
Cabo Frio	1187	BRCF	N.D.	N.D.	N.D.	N.D.	N.D.	0.41	N.D.	0.73	N.D.	1.59	N.D.	1.35
Cabo Frio	1190	BRCF	N.D.	<0.09	Tr	3.11	0.91	N.D.	<0.02	0.29	3.33	0.66	<0.01	7.56
Bahía Guanabara	1193	BRGB	1.11	N.D.	N.D.	11.6	4.2	1.43	N.D.	13	2.09	8.15	Tr	1.06
Bahía Guanabara	1194	BRGB	N.D.	<0.09	<0.01	7.81	1.18	N.D.	0.74	6.86	2.89	11.3	<0.01	3.14
Santos	1153	BRSB	0.53	N.D.	N.D.	5.58	N.D.	0.31	0.69	31.96	1.22	5.04	Tr	2.3
Santos	1154	BRSB	N.D.	<0.09	<0.01	5.11	<0.02	N.D.	0.56	6.07	0.48	1.45	<0.01	1.19
Bahía Paranagua	1195	BRPB	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.42	4.12	N.D.	2.45	N.D.	N.D.

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	Cis Nonachlor	Methoxychlor	Aldrin	Dieldrin	Endrin	Mirex	2 4 DDE O P DDE	4 4 DDE P P DDE	2 4 DDD O P DDD	4 4 DDD P P DDD	2 4 DDT O P DDT	4 4 DDT P P DDT
Bahía Paranagua	1198	BRPB	N.D.	<0.09	<0.01	<0.01	Tr	N.D.	Tr	4.48	0.38	5.61	<0.01	<0.03
Lagoa dos Patos	1199	BRLP	N.D.	N.D.	N.D.	1.51	0.93	Tr	N.D.	0.82	N.D.	N.D.	N.D.	N.D.
Lagoa dos Patos	1202	BRLP	N.D.	<0.09	<0.01	1.03	0.41	N.D.	<0.02	0.98	Tr	1.54	<0.01	0.25
Punta del Este	1014	URPE	N.D.	<0.09	0.43	<0.01	0.48	N.D.	<0.02	5.6	0.77	4.6	<0.01	<0.03
Santa Lucia	1020	URSL	1.22	N.D.	N.D.	9.5	3.78	6.35	1.45	21.3	Tr	6.3	4.51	4.76
Hudson	1002	ARHU	N.D.	0.97	Tr	13	0.32	N.D.	<0.02	80	20	89	2.3	<0.03
Hudson	1004	ARHU	36.62	N.D.	2.03	19.62	2.43	5.69	N.D.	80.02	11	122.78	10.79	10.97
Atalaya	1008	ARAT	7.15	N.D.	N.D.	3.29	0.68	1.89	0.3	20.09	2.91	36.07	5.01	2.83
Mar del Plata	1024	ARMP	N.D.	N.D.	N.D.	N.D.	0.87	N.D.	N.D.	0.77	N.D.	N.D.	Tr	Tr
Pehuen-co	1027A	ARPC	0.55	N.D.	N.D.	1.89	1.3	N.D.	N.D.	2.79	N.D.	N.D.	N.D.	0.56
Pehuen-co	1027B	ARPC	0.87	N.D.	N.D.	1.51	2	N.D.	N.D.	3.09	N.D.	N.D.	N.D.	0.68
Arroyo Parejas	1029	ARAP	2.72	N.D.	N.D.	2.28	N.D.	1.03	Tr	9.86	2.26	10.76	1.77	1.91
Rawson	1033	ARRA	0.26	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	1.53	N.D.	0.49	N.D.	N.D.
Bahia Camarones	1037	ARCA	0.66	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	2.4	0.53	1.97	N.D.	N.D.
Bahia Camarones	1040	ARCA	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	1.02	Tr	N.D.	N.D.	N.D.
Bahia Camarones	1042	ARCA	N.D.	<0.09	0.45	<0.01	0.41	N.D.	Tr	0.94	3.3	Tr	<0.01	<0.03
Bahia Camarones	1043	ARCA	1.16	N.D.	1.04	1.39	1.21	1.16	0.8	2.25	Tr	1.83	0.56	0.95
Punta Loyola	1052	ARPL	0.98	N.D.	1.26	N.D.	1.43	0.37	N.D.	1.56	Tr	Tr	N.D.	1.12
Ushuaia	1046	ARUS	N.D.	<0.09	Tr	<0.01	0.4	N.D.	Tr	0.96	0.56	2	<0.01	0.35
Punta Arenas	1209	CHPA	1.48	N.D.	N.D.	4.72	N.D.	1.46	N.D.	6.29	0.96	6.82	1.29	1.58
Punta Arenas	1211	CHPA	1.1	N.D.	N.D.	0.91	N.D.	0.43	N.D.	4.46	0.31	4.12	0.82	1.86
Punta Arenas	1212	CHPA	N.D.	Tr	Tr	0.25	Tr	N.D.	<0.02	6.92	0.92	3.49	<0.01	2.9
Punta Arenas	1213	CHPA	1.04	N.D.	N.D.	1.69	0.68	0.36	N.D.	8.88	0.46	5.89	1.77	5.32
Puerto Montt	1203	CHPM	N.D.	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	N.D.	Tr	N.D.	N.D.	N.D.
Puerto Montt	1205	CHPM	N.D.	N.D.	N.D.	N.D.	9.67	Tr	N.D.	1.87	N.D.	N.D.	N.D.	4.04

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	Cis Nonachlor	Methoxychlor	Aldrin	Dieldrin	Endrin	Mirex	2 4 DDE O P DDE	4 4 DDE P P DDE	2 4 DDD O P DDD	4 4 DDD P P DDD	2 4 DDT O P DDT	4 4 DDT P P DDT
Puerto Montt	1206	CHPM	N.D.	N.D.	N.D.	0.46	1.01	N.D.	N.D.	0.41	N.D.	N.D.	Tr	N.D.
Puerto Montt	1208	CHPM	N.D.	<0.09	<0.01	1.94	<0.02	N.D.	<0.02	0.95	Tr	1.13	<0.01	1.15
Concepcion	1229	CHCO	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	3.25	Tr	1.53	0.37	1.26
Concepcion	1231	CHCO	0.48	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	2.84	Tr	0.5	Tr	1.17
Concepcion	1234	CHCO	N.D.	6.26	<0.01	0.35	0.77	N.D.	<0.02	0.38	Tr	Tr	<0.01	<0.01
Valparaiso	1216	CHVA	N.D.	1.6	<0.01	2.16	<0.02	N.D.	0.96	38.6	8.44	36.7	<0.01	58.4
LA Serena	1217	CHLS	0.76	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.26	N.D.	2.35	N.D.
LA Serena	1218	CHLS	N.D.	2.79	<0.01	0.9	<0.02	N.D.	<0.02	0.69	0.52	<0.02	<0.01	<0.03
Antofagasta	1228	CHAN	N.D.	9.43	<0.01	2.5	0.41	N.D.	Tr	10.8	1.11	5.58	Tr	3.92
Arica	1222	CHAR	N.D.	3.6	<0.01	0.52	0.79	N.D.	Tr	3	0.28	1.48	<0.01	Tr
Arica	1225A	CHAR	0.43	N.D.	N.D.	1.8	N.D.	N.D.	0.53	3.82	N.D.	0.66	N.D.	1.4
Arica	1225B	CHAR	0.6	N.D.	N.D.	1.51	N.D.	N.D.	0.31	3.95	N.D.	1.08	Tr	1.32
Paracas	1239	PEPA	N.D.	N.D.	0.9	N.D.	N.D.	N.D.	N.D.	9.56	N.D.	N.D.	N.D.	1.33
Paracas	1240	PEPA	N.D.	1.23	<0.01	0.96	0.36	N.D.	Tr	10.7	0.38	1.99	<0.01	2.2
Paracas	1241	PEPA	0.38	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	11.26	Tr	0.55	N.D.	1.66
Paracas	1242	PEPA	N.D.	0.8	0.33	0.27	0.45	N.D.	Tr	8.82	0.44	2	0.25	0.73
Callao	1235A	PECA	0.82	N.D.	N.D.	N.D.	N.D.	N.D.	0.36	24.06	0.9	13.11	1.32	2.65
Callao	1235B	PECA	0.78	N.D.	N.D.	N.D.	N.D.	N.D.	0.45	28.88	1.16	14.69	1.25	3.14
Guayaquil	1244	ECGU	N.D.	<0.13	<0.01	0.5	<0.02	N.D.	1.52	55.6	15.3	80	<0.01	2.54
Río Chone	1247	ECCR	0.34	N.D.	Tr	INT.	N.D.	N.D.	2.72	14.65	0.43	11.19	0.37	1.43
Río Chone	1248	ECCR	N.D.	0.68	Tr	Tr	<0.02	N.D.	Tr	9.73	0.55	5.48	<0.01	0.56
Río Chone	1249	ECCR	0.8	N.D.	N.D.	N.D.	0.48	N.D.	N.D.	8.46	0.39	7.8	0.48	N.D.
Bahia Tumaco	1107	COBT	0.28	N.D.	N.D.	3.75	N.D.	N.D.	2.1	38.98	5.48	71.6	0.47	5.12
Bahia Tumaco	1110	COBT	N.D.	<0.09	Tr	0.54	<0.02	N.D.	Tr	5.62	3.54	9.4	1.43	0.53
Bahia Tumaco	1111	COBT	0.61	N.D.	N.D.	2.08	N.D.	N.D.	0.51	13.94	2.3	27.19	N.D.	1.62
Bahia Tumaco	1113	COBT	N.D.	N.D.	N.D.	N.D.	N.D.	Tr	Tr	11.7	2.48	26.24	N.D.	2.27
Playa Bique	1060	PABI	N.D.	<0.09	0.48	<0.01	0.68	N.D.	<0.02	3.8	0.72	4.3	0.37	<0.03
Punta Chame	1064	PAPC	N.D.	N.D.	0.85	N.D.	N.D.	N.D.	N.D.	1.88	N.D.	N.D.	N.D.	N.D.

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	Cis Nonachlor	Methoxychlor	Aldrin	Dieldrin	Endrin	Mirex	2 4 DDE O P DDE	4 4 DDE P P DDE	2 4 DDD O P DDD	4 4 DDD P P DDD	2 4 DDT O P DDT	4 4 DDT P P DDT
Golfito	1082	CRGO	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Golfito	1083A	CRGO	0.28	N.D.	Tr	N.D.	N.D.	0.85	0.52	22.11	1.49	14.31	Tr	Tr
Golfito	1083B	CRGO	0.41	N.D.	N.D.	N.D.	N.D.	0.82	0.49	20.26	1.34	13.74	0.6	0.29
Golfito	1085	CRGO	Tr	N.D.	0.54	INT.	N.D.	0.58	0.48	13.64	0.47	10.07	0.3	2.7
Punta Zancudo	1090	CRPZ	N.D.	0.57	<0.01	Tr	<0.02	N.D.	<0.02	2.06	0.43	3.2	<0.01	<0.03
Estero Jicaral	1072	CREJ	Tr	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	6.98	N.D.	1.3	N.D.	N.D.
Isla Paloma	1075	CRIP	N.D.	N.D.	Tr	N.D.	N.D.	N.D.	N.D.	2.45	Tr	N.D.	N.D.	N.D.
Estero Cocoroca	1077	CREC	N.D.	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	2.79	Tr	2.02	N.D.	N.D.
Estero Cocoroca	1078	CREC	N.D.	<0.09	Tr	Tr	0.26	N.D.	Tr	2.6	Tr	1.03	0.37	<0.03
Estero Cocoroca	1079A	CREC	0.46	N.D.	N.D.	N.D.	Tr	Tr	N.D.	3.09	N.D.	1.19	N.D.	N.D.
Estero Cocoroca	1079B	CREC	0.44	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	2.81	Tr	1.26	N.D.	N.D.
Ostional	1070	NIOS	N.D.	<0.09	0.48	<0.01	<0.02	N.D.	N.D.	0.93	0.94	0.25	<0.01	0.29
Isla de Aserradores	1066	NIIA	4.04	N.D.	N.D.	4.73	N.D.	N.D.	3.77	177.42	0.49	16.53	N.D.	1.31
San Lorenzo	1262	HOGF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.3	13.06	Tr	3.58	N.D.	0.75
San Lorenzo	1263	HOGF	N.D.	N.D.	N.D.	Tr	N.D.	N.D.	N.D.	10.1	N.D.	1.9	N.D.	N.D.
Puerto La Union	1252	ESGF	N.D.	0.66	<0.01	Tr	<0.02	N.D.	Tr	10	Tr	1.24	<0.01	0.29
La Libertad	1256	ESLL	0.38	N.D.	N.D.	N.D.	N.D.	0.4	2.24	115.51	1.32	23.22	3.09	32.17
Puerto Madero	1292	MEPM	N.D.	2.35	<0.01	Tr	Tr	N.D.	0.44	71.6	4.2	22	Tr	30.9
Bahia Ventosa	1283	MELV	0.31	N.D.	N.D.	N.D.	N.D.	N.D.	1.41	135.92	1	21.49	2.4	14.49
Bahia Ventosa	1286	MELV	N.D.	<0.09	<0.01	Tr	<0.02	N.D.	<0.02	30.7	0.68	5.15	Tr	6.22
Puerto Escondido	1289	MEPE	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	25.85	N.D.	7.98	1.57	12.64
Mazatlan	1309	MEMA	0.82	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	6.68	N.D.	2.24	Tr	1.14
Altata-Pabellon	1317	MEAP	0.89	N.D.	Tr	2.54	N.D.	N.D.	13.52	68.62	0.4	9.12	N.D.	2.27
Altata-Pabellon	1318	MEAP	N.D.	0.37	<0.01	1.76	Tr	N.D.	0.89	40.5	1.98	7.06	Tr	2.52

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Site	ID	Code	Cis Nonachlor	Methoxychlor	Aldrin	Dieldrin	Endrin	Mirex	2 4 DDE O P DDE	4 4 DDE P P DDE	2 4 DDD O P DDD	4 4 DDD P P DDD	2 4 DDT O P DDT	4 4 DDT P P DDT
San Felipe	1305	MESF	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	8.71	N.D.	N.D.	N.D.	0.46
San Carlos	1307	MESC	Tr	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	1.4	N.D.	N.D.	N.D.	N.D.
Ensenada	1303	MEEN	0.41	N.D.	N.D.	N.D.	0.83	N.D.	0.46	21.65	0.68	12.36	0.62	4.25
Ensenada	1304	MEEN	N.D.	19.6	<0.01	0.35	<0.02	N.D.	0.29	20.3	6.77	10.1	0.29	4.74
Punta Banderas	1301A	MEPB	0.9	N.D.	N.D.	2.17	N.D.	N.D.	0.51	40.41	0.27	10.59	N.D.	7.14
Punta Banderas	1301B	MEPB	1.02	N.D.	N.D.	2.4	N.D.	N.D.	1.01	39.71	0.64	10.68	N.D.	7.53
Deer Island	1401	DI119	6.85	N.D.	N.D.	6.03	1.47	1.05	2.22	24.75	1.95	16.33	4.13	7.81
Deer Island	1402	DI227	10.35	N.D.	N.D.	9.33	1.18	1.05	2.54	32.86	1.81	19.15	4.13	10.3
Deer Island	1403	DI530	10.04	N.D.	N.D.	10.8	2.11	1.16	2.9	31.63	2.9	22.05	4.02	9.81
Staten Island	1404	SITXA	15.91	N.D.	N.D.	25.17	N.D.	4.24	3.57	55.18	2.74	34	4.5	4.46
Staten Island	1405	SITXB	14.87	N.D.	N.D.	24.58	N.D.	3.95	3.54	56.2	2.99	37.25	4.79	4.97
Staten Island	1406	SITXC	16.93	N.D.	N.D.	27.51	N.D.	4.05	3.41	63.45	3.04	39.31	5.29	4.91
GERG Blank	1408	BLTX1	Tr	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	0.46	Tr	Tr	N.D.	N.D.
Deer Island	1409	DI179	N.D.	1.17	N.D.	1.96	Tr	N.D.	0.55	23.3	6.69	18.4	N.D.	10.3
Deer Island	1410	DI293	N.D.	5.79	N.D.	4.17	0.29	N.D.	0.57	22.4	6.38	17.9	N.D.	4.36
Deer Island	1411	DI492	N.D.	4.98	N.D.	2.42	0.94	N.D.	0.43	20.1	5.63	17	Tr	7.39
Unknown	1413	XXMN	N.D.	0.46	N.D.	3.51	0.7	N.D.	5.13	64.2	9.04	47.75	N.D.	1.96
ILMR Blank NIST	1415	NISTMN	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 1	1416	BLMN1	N.D.	N.D.	N.D.	N.D.	N.D..	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
GERG Blank 2	1417	BLTX2	N.D.	N.D.	N.D.	0.45	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
GERG Blank 3	1418	BLTX3	N.D.	N.D.	N.D.	Tr	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
GERG Blank 4	1419	BLTX4	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.53	N.D.	N.D.	N.D.	N.D.
GERG Blank 5	1420	BLTX5	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.32	Tr	0.43	N.D.	N.D.
GERG Blank 6	1421	BLTX6	Tr	N.D.	Tr	N.D.	Tr	N.D.	Tr	Tr	Tr	0.26	N.D.	N.D.
NOAA QA	1422	NOMN1A	N.D.	N.D.	<0.05	1.82	N.D.	<0.15	0.33	9.26	10.1	33.1	<0.12	2.2
NOAA QA	1423	NOMN1B	N.D.	N.D.	<0.05	1.91	N.D.	<0.15	0.38	8.25	9.29	36.6	<0.12	2.79
NOAA QA	1424	NOMN1C	N.D.	N.D.	<0.05	1.82	N.D.	<0.15	0.32	9.4	10.8	36.1	<0.12	2.45
NOAA QA	1425	NOMN2	N.D.	N.D.	<0.05	1.7	N.D.	<0.15	0.36	9.1	9.71	24.8	<0.12	2.06

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	Cis Nonachlor	Methoxychlor	Aldrin	Dieldrin	Endrin	Mirex	2 4 DDE O P DDE	4 4 DDE P P DDE	2 4 DDD O P DDD	4 4 DDD P P DDD	2 4 DDT O P DDT	4 4 DDT P P DDT
NOAA QA	1426	NOMN3	N.D.	N.D.	<0.05	2.51	N.D.	<0.15	0.43	9.66	8.07	27.7	<0.12	3.33
ILMR Blank 2	1427	BLMN2	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 3	1428	BLMN3	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 4	1429	BLMN4	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 5	1430	BLMN5	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	290	N.D.	1150	N.D.	480
ILMR Blank 6	1431	BLMN6	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 7	1432	BLMN7	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 8	1433	BLMN8	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
NOAA QA74	1434	NOTX1A	N.D.	N.D.	N.D.	21	N.D.	N.D.	N.D.	45.9	5.1	54.6	5.8	7.8
NOAA QA74	1435	NOTX1B	N.D.	N.D.	N.D.	20.4	N.D.	N.D.	N.D.	40.1	6.1	50.9	6.3	4.1
NOAA QA74	1436	NOTX1C	N.D.	N.D.	N.D.	10.7	N.D.	N.D.	N.D.	36.5	3.5	34.4	2.1	4.5
NOAA QA74	1437	NOTX1D	N.D.	N.D.	N.D.	14.9	N.D.	N.D.	N.D.	5.8	8.1	58	5.9	4.8
NOAA QA74	1438	NOTX1E	N.D.	N.D.	N.D.	16.7	N.D.	N.D.	N.D.	44.5	6.9	51.9	7.7	4.5
NOAA QA74	1439	NOTX1F	N.D.	N.D.	N.D.	11.5	N.D.	N.D.	N.D.	46.6	6.6	59.4	8.4	4.4
NOAA QA74	1440	NOTX1G	N.D.	N.D.	N.D.	17.6	N.D.	N.D.	N.D.	51.4	6.5	58.5	7.8	8.2
GERG Blank 7	1441	BLTX7	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
GERG Blank 8	1442	BLTX8	0.7	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.41	N.D.	N.D.	N.D.	N.D.
NOAA QA92	1443	NOTX2A	7.22	N.D.	5.12	5.39	1.78	0.49	N.D.	35.8	4.38	24.88	4.05	6.96
NOAA QA92	1444	NOTX2B	8.28	N.D.	4.64	4.78	1.15	0.41	N.D.	43.85	4.74	28.82	5.13	7.65
NOAA QA92	1445	NOTX2C	9.64	N.D.	5.18	5.9	2.25	0.29	N.D.	40.52	4.75	29.46	6.05	7.36
NOAA QA92	1446	NOTX2D	8.55	N.D.	4.29	6.01	2.43	0.55	N.D.	43.42	5.47	29.17	3.08	7.53
NOAA QA92	1447	NOTX2E	7.46	N.D.	1.99	6.05	1.7	0.35	N.D.	40.42	4.61	27.56	4.93	7.61
Staten Island	1448	SIMNA	N.D.	1.97	0.3	5.82	0.55	N.D.	N.D.	24.7	7.9	29.8	N.D.	2.56
Staten Island	1449	SIMNB	N.D.	1.8	Tr	7.46	0.48	N.D.	N.D.	21.1	7.55	29.4	N.D.	2.62
Staten Island	1450	SIMNC	N.D.	1.2	Tr	6.88	0.63	N.D.	N.D.	22.1	7.07	26.3	N.D.	2.92

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	PCB 8 CL2	PCB 18 CL3	PCB 28 CL3	PCB 31	PCB 44 CL4	PCB 49	PCB 52 CL4	PCB 66 CL4	PCB 101 CL5	PCB 105 CL5	PCB 110 77 CL5	*PCB 118 108 (149)	PCB 128 CL6	PCB 138 CL6
Laguna Madre	1297	MELM	1.3	4.2	3.5	N.D.	2.7	N.D.	3.6	3.3	3.4	2.5	5.7	4.9	2.5	N.D.
Tampico	1293	META	1.3	2.7	N.D.	N.D.	Tr	N.D.	N.D.	N.D.	1.3	N.D.	5	Tr	0.5	3.9
Laguna de Ostion	1279	MELO	1.4	1.5	1.8	N.D.	0.9	0.6	N.D.	1.9	0.9	0.8	1.4	1.3	1.7	3.4
Laguna de Ostion	1280	MELO	N.D.	N.D.	3.4	2.48	N.D.	1.17	1.32	N.D.	0.51	0.36	N.D.	2.4	N.D.	3.21
Laguna de Términos	1275	MELT	0.4	N.D.	N.D.	N.D.	0.3	N.D.	N.D.	N.D.	0.8	Tr	2.2	N.D.	N.D.	1.5
Belize City	1258	BEBC	N.D.	N.D.	2.25	3.51	N.D.	0.64	2.3	N.D.	2.63	1.63	N.D.	4	N.D.	3.79
La Ceiba	1260	HOLC	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	N.D.	Tr	N.D.	N.D.	0.4	Tr	N.D.	0.9
Tortuguero	1148	CRTO	0.5	N.D.	N.D.	N.D.	Tr	Tr	0.3	Tr	N.D.	N.D.	0.5	0.4	N.D.	N.D.
Puerto Almirante	1092	PAPA	N.D.	0.4	Tr	N.D.	0.3	Tr	0.6	0.9	0.3	Tr	0.4	Tr	Tr	1.3
Portobelo	1057	PAPB	N.D.	N.D.	0.6	N.D.	0.3	N.D.	N.D.	N.D.	N.D.	N.D.	0.3	1	N.D.	1.4
Bahia de Cartagena	1096	COBC	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	N.D.	0.7	Tr	N.D.	0.9	0.5	N.D.	1.5
Bahia de Cartagena	1098	COBC	Tr	N.D.	N.D.	N.D.	Tr	Tr	Tr	N.D.	Tr	N.D.	1	Tr	N.D.	1
Cienaga Grande	1100	COCG	N.D.	Tr	N.D.	N.D.	0.3	N.D.	Tr	N.D.	Tr	Tr	0.3	Tr	Tr	1.2
Cienaga Grande	1102	COCG	N.D.	N.D.	1.18	1.34	N.D. •	0.48	1.76	N.D.	0.83	<0.03	0.47	0.44	N.D.	0.4
Commander's Bay	1142	ARCB	Tr	N.D.	Tr	N.D.	0.3	0.6	0.9	N.D.	17.5	4.9	19.6	6.9	3.7	62.6
Morrocoy	1122	VEMO	N.D.	N.D.	1.62	1.9	N.D.	0.5	2.25	N.D.	0.84	Tr	0.42	Tr	N.D.	0.28
Paparo	1116	VEPA	N.D.	Tr	N.D.	N.D.	0.4	0.4	0.6	Tr	3.5	1.4	4.3	1.7	1.1	11
Cumana	1130	VECU	Tr	N.D.	N.D.	N.D.	Tr	N.D.	Tr	Tr	Tr	0.5	1.6	Tr	0.3	1.2
Caroni Swamp	1132	TRCS	N.D.	N.D.	N.D.	N.D.	Tr	Tr	N.D.	N.D.	0.5	N.D.	0.8	1.4	Tr	2
Caroni Swamp	1134	TRCS	N.D.	N.D.	2.59	2.95	N.D.	0.92	4.16	N.D.	1.92	0.32	1.04	0.62	N.D.	1.2
Southern Range	1136A	TRSR	Tr	N.D.	N.D.	N.D.	0.3	Tr	Tr	Tr	Tr	N.D.	Tr	Tr	N.D.	0.8
Southern Range	1136B	TRSR	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Bowden	1267	JABO	0.8	Tr	0.4	N.D.	Tr	Tr	Tr	N.D.	Tr	0.5	2.9	0.4	N.D.	1.4

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	PCB 8 CL2	PCB 18 CL3	PCB 28 CL3	PCB 31	PCB 44 CL4	PCB 49	PCB 52 CL4	PCB 66 CL4	PCB 101 CL5	PCB 105 CL5	PCB 110 77 CL5	*PCB 118 108 (149)	PCB 128 CL6	PCB 138 CL6
Bowden	1268	JABO	N.D.	N.D.	0.49	0.56	N.D.	Tr	0.78	N.D.	<0.02	Tr	N.D.	Tr	N.D.	0.52
Port Royal	1272	JAPR	2	N.D.	0.8	N.D.	0.4	1.1	N.D.	0.6	1.1	0.7	2.2	0.5	N.D.	4.2
Cayo Culebra	1313	CUCC	0.8	N.D.	0.6	N.D.	N.D.	Tr	Tr	N.D.	Tr	N.D.	2.2	2	Tr	1.3
Cayo Culebra	1314	CUCC	N.D.	N.D.	Tr	0.26	N.D.	Tr	0.39	N.D.	Tr	Tr	N.D.	0.34	N.D.	0.57
Bragança	1182	BRBR	N.D.	N.D.	0.69	0.76	N.D.	Tr	0.42	N.D.	Tr	Tr	N.D.	Tr	N.D.	Tr
Sao Luis	1177	BRSL	N.D.	N.D.	0.4	N.D.	Tr	N.D.	0.4	N.D.	0.3	0.3	7.8	N.D.	N.D.	2.8
Fortaleza	1171	BRFO	1	N.D.	N.D.	N.D.	0.3	Tr	0.3	0.6	0.8	0.4	2	0.9	0.4	3.2
Fortaleza	1175	BRFO	N.D.	N.D.	0.4	N.D.	Tr	N.D.	0.4	N.D.	0.6	1	5.4	0.4	Tr	3.7
Fortaleza	1176	BRFO	N.D.	N.D.	0.79	0.73	N.D.	Tr	0.54	N.D.	0.82	0.53	0.82	1.05	N.D.	1.86
Recife	1163	BRRE	1.1	2.3	8.2	N.D.	3.6	4.4	6.7	3.7	8.5	3	15.5	9.2	1.2	9.5
Recife	1164	BRRE	N.D.	N.D.	4.03	3.82	N.D.	0.87	3.65	N.D.	3.46	3.11	N.D.	2.76	N.D.	2.34
Recife	1167	BRRE	1.3	4.1	11.2	N.D.	5.8	7.3	11	7.5	14.5	6.4	33.3	15.3	3.8	16.4
Lagoa Mundaú	1170	BRLM	N.D.	N.D.	2.74	2.89	N.D.	0.28	0.9	N.D.	0.94	0.41	N.D.	1.1	N.D.	1.82
Salvador	1159	PABI	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Salvador	1161	BRSA	1	N.D.	1.2	N.D.	Tr	0.3	0.3	N.D.	Tr	0.4	3	0.4	N.D.	2.8
Salvador	1162	BRSA	2.8	1	1.8	N.D.	0.3	N.D.	Tr	N.D.	Tr	0.3	3.4	Tr	N.D.	2.5
Vitoria	1183A	BRVI	Tr	N.D.	1.8	N.D.	0.8	N.D.	3	0.8	1.1	1	6.7	3.4	1.1	9.1
Vitoria	1183B	BRVI	0.3	N.D.	2.4	N.D.	0.5	N.D.	4.4	1	1.5	1.3	9.7	3.9	1.2	9.7
Cabo Frio	1187	BRCF	1	N.D.	Tr	N.D.	0.3	N.D.	Tr	Tr	0.5	N.D.	7.3	0.3	1.1	3.1
Cabo Frio	1190	BRCF	N.D.	N.D.	0.94	0.99	N.D.	Tr	0.73	N.D.	0.38	Tr	N.D.	0.51	N.D.	0.71
Bahía Guanabara	1193	BRGB	5	2.2	16.8	N.D.	1.8	N.D.	18	4.3	7	3.9	5	7.8	10.5	12.9
Bahía Guanabara	1194	BRGB	N.D.	N.D.	11.8	8.27	N.D.	1.82	7.3	N.D.	5.87	1.98	N.D.	5.87	N.D.	8.94
Santos	1153	BRSB	0.8	N.D.	2.2	N.D.	0.3	N.D.	INT.	N.D.	1.3	1.1	7.5	3.1	0.5	6.5
Santos	1154	BRSB	N.D.	N.D.	2.15	1.76	N.D.	3.71	1.36	N.D.	1.82	0.59	N.D.	2.3	N.D.	4.03
Bahía Paranagua	1195	BRPB	N.D.	N.D.	N.D.	N.D.	Tr	0.6	N.D.	N.D.	Tr	N.D.	1.8	N.D.	N.D.	1.3

Site	ID	Code	PCB 8 CL2	PCB 18 CL3	PCB 28 CL3	PCB 31	PCB 44 CL4	PCB 49	PCB 52 CL4	PCB 66 CL4	PCB 101 CL5	PCB 105 CL5	PCB 110 77 CL5	*PCB 118 108 (149)	PCB 128 CL6	PCB 138 CL6
Bahía Paranagua	1198	BRPB	N.D.	N.D.	0.7	0.75	N.D.	0.81	1.19	N.D.	0.53	Tr	Tr	Tr	N.D.	0.55
Lagoa dos Patos	1199	BRLP	N.D.	N.D.	6.1	N.D.	Tr	N.D.	0.6	N.D.	Tr	0.5	5.3	0.4	0.4	3.7
Lagoa dos Patos	1202	BRLP	N.D.	N.D.	1.17	0.92	N.D.	0.57	1.56	N.D.	1.26	0.39	N.D.	0.91	N.D.	1.46
Punta del Este	1014	URPE	N.D.	N.D.	1.68	2.05	N.D.	0.45	2.3	N.D.	3.9	2.3	3.1	4	N.D.	11
Santa Lucia	1020	URSL	1	2.9	Tr	N.D.	N.D.	N.D.	0.8	1.5	3.3	2.4	3.9	6.3	N.D.	9.5
Hudson	1002	ARHU	N.D.	N.D.	7.82	8.04	N.D.	11	44	N.D.	240	101	210	170	N.D.	240
Hudson	1004	ARHU	0.3	7.1	13.7	N.D.	66.1	42.3	109.9	171.2	198.3	54.1	145.2	145.7	41.5	335.8
Atalaya	1008	ARAT	Tr	0.5	1.4	N.D.	7.4	2.4	N.D.	49.2	52.4	14.5	111	48.7	19.5	209.6
Mar del Plata	1024	ARMP	N.D.	N.D.	0.5	N.D.	Tr	N.D.	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	N.D.	0.5
Pehuen-co	1027A	ARPC	N.D.	2	N.D.	N.D.	N.D.	Tr	2.5	N.D.	0.5	N.D.	8	0.3	N.D.	3.1
Pehuen-co	1027B	ARPC	Tr	2.2	N.D.	N.D.	N.D.	Tr	2.7	N.D.	0.6	N.D.	6.8	0.3	Tr	3.3
Arroyo Parejas	1029	ARAP	Tr	0.5	0.6	N.D.	1.5	2.9	4.8	1.1	9.2	2.8	14.5	8.4	1.3	10.8
Rawson	1033	ARRA	N.D.	N.D.	0.5	N.D.	0.4	N.D.	0.6	Tr	Tr	N.D.	N.D.	Tr	N.D.	3.7
Bahia Camarones	1037	ARCA	N.D.	N.D.	0.3	N.D.	Tr	N.D.	0.3	0.4	0.3	N.D.	2.2	Tr	0.3	1.6
Bahia Camarones	1040	ARCA	0.3	N.D.	N.D.	N.D.	Tr	N.D.	N.D.	N.D.	0.3	N.D.	1.3	N.D.	N.D.	1.9
Bahia Camarones	1042	ARCA	N.D.	N.D.	1.71	2.05	N.D.	0.41	1.7	N.D.	0.95	Tr	0.64	<0.02	N.D.	0.59
Bahia Camarones	1043	ARCA	3	1.1	1.5	N.D.	1.2	N.D.	2.7	1.5	1.4	1.3	4.6	1.6	1.7	2.7
Punta Loyola	1052	ARPL	INT.	0.6	0.6	N.D.	0.4	0.4	0.8	N.D.	0.3	0.6	4	0.5	0.8	2.3
Ushuaia	1046	ARUS	N.D.	N.D.	2.2	3	N.D.	0.7	3.2	N.D.	2.8	1.2	2.5	1.7	N.D.	3.4
Punta Arenas	1209	CHPA	N.D.	0.4	1.2	N.D.	1.2	1	3.9	1.1	12.2	4.1	25.4	8.9	2.2	16.4
Punta Arenas	1211	CHPA	N.D.	Tr	0.6	N.D.	0.9	1.6	2.8	1	10.4	3.5	21.8	7.7	1.9	15.4
Punta Arenas	1212	CHPA	N.D.	N.D.	1.32	1.49	N.D.	0.72	3.45	N.D.	11.7	5.5	8.99	10	N.D.	13.7
Punta Arenas	1213	CHPA	INT.	Tr	0.9	N.D.	0.9	1.4	4.1	1.1	14.4	3.6	29.1	11.1	2.7	27.5
Puerto Montt	1203	CHPM	0.5	N.D.	N.D.	N.D.	Tr	N.D.	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	N.D.	N.D.
Puerto Montt	1205	CHPM	Tr	N.D.	0.6	N.D.	Tr	N.D.	Tr	N.D.	0.6	0.6	4.6	N.D.	0.8	5.2

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Site	ID	Code	PCB 8 CL2	PCB 18 CL3	PCB 28 CL3	PCB 31	PCB 44 CL4	PCB 49	PCB 52 CL4	PCB 66 CL4	PCB 101 CL5	PCB 105 CL5	PCB 110 77 CL5	*PCB 118 108 (149)	PCB 128 CL6	PCB 138 CL6
Puerto Montt	1206	CHPM	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	Tr	Tr	Tr	1.4	N.D.	N.D.	N.D.
Puerto Montt	1208	CHPM	N.D.	N.D.	2.23	1.9	N.D.	0.46	1.77	N.D.	0.66	0.32	N.D.	0.47	N.D.	0.34
Concepcion	1229	CHCO	N.D.	N.D.	Tr	N.D.	0.6	N.D.	0.5	N.D.	0.5	1	2.6	1	N.D.	2.1
Concepcion	1231	CHCO	6.6	N.D.	Tr	N.D.	0.4	0.9	0.4	N.D.	Tr	0.9	3.3	1.3	Tr	2.7
Concepcion	1234	CHCO	N.D.	N.D.	1.19	1.48	N.D.	Tr	0.4	N.D.	Tr	Tr	N.D.	0.38	N.D.	0.28
Valparaiso	1216	CHVA	N.D.	N.D.	2.24	1.64	N.D.	1.17	2.88	N.D.	6.42	3.09	N.D.	6.64	N.D.	11.4
LA Serena	1217	CHLS	INT.	N.D.	Tr	N.D.	Tr	N.D.	N.D.	Tr	0.5	Tr	0.3	N.D.	Tr	0.4
LA Serena	1218	CHLS	N.D.	N.D.	0.51	0.55	N.D.	Tr	Tr	N.D.	Tr	Tr	N.D.	3.77	N.D.	Tr
Antofagasta	1228	CHAN	N.D.	N.D.	1.12	1.14	N.D.	Tr	0.82	N.D.	0.54	0.34	N.D.	0.67	N.D.	1.35
Arica	1222	CHAR	N.D.	N.D.	1.11	1.09	N.D.	0.26	0.73	N.D.	0.62	0.41	N.D.	1.55	N.D.	1.01
Arica	1225A	CHAR	Tr	Tr	1.6	N.D.	0.3	1.3	0.5	1.2	0.7	0.7	N.D.	3	Tr	4.3
Arica	1225B	CHAR	0.5	Tr	1	N.D.	0.3	1.3	0.8	0.8	0.7	1	N.D.	3.2	Tr	3
Paracas	1239	PEPA	N.D.	N.D.	N.D.	N.D.	0.4	N.D.	Tr	N.D.	0.6	Tr	2.7	1.3	Tr	2.8
Paracas	1240	PEPA	N.D.	N.D.	1.04	1.16	N.D.	Tr	0.64	N.D.	0.79	0.37	N.D.	0.99	N.D.	2.08
Paracas	1241	PEPA	0.5	N.D.	0.5	N.D.	N.D.	N.D.	Tr	N.D.	0.6	0.3	2.9	1.2	N.D.	3.2
Paracas	1242	PEPA	N.D.	N.D.	1.1	1.2	N.D.	Tr	1	N.D.	0.91	0.41	N.D.	0.98	N.D.	1.83
Callao	1235A	PECA	N.D.	N.D.	1.2	N.D.	0.5	1	1.6	1.1	5.4	2.1	11.9	6.1	1.4	17
Callao	1235B	PECA	N.D.	N.D.	1.3	N.D.	0.6	1.3	1.8	1.2	6.1	2.2	13.3	7.3	1.7	18.2
Guayaquil	1244	ECGU	N.D.	N.D.	2.82	4.15	N.D.	0.91	2.87	N.D.	1.32	1.23	N.D.	1.87	N.D.	2.3
Río Chone	1247	ECCR	0.8	N.D.	Tr	N.D.	Tr	Tr	0.4	0.3	0.4	Tr	3.6	0.4	0.5	2.4
Río Chone	1248	ECCR	N.D.	N.D.	1.3	1.24	N.D.	Tr	0.8	N.D.	0.3	Tr	N.D.	Tr	N.D.	0.33
Río Chone	1249	ECCR	0.3	N.D.	0.5	N.D.	Tr	N.D.	Tr	N.D.	N.D.	N.D.	Tr	N.D.	N.D.	4.1
Bahia Tumaco	1107	COBT	0.3	N.D.	N.D.	N.D.	Tr	INT.	Tr	Tr	0.4	N.D.	0.6	Tr	N.D.	N.D.
Bahia Tumaco	1110	COBT	N.D.	N.D.	1.36	2.74	N.D.	0.57	2.84	N.D.	1.6	0.47	0.95	0.69	N.D.	0.59
Bahia Tumaco	1111	COBT	0.4	N.D.	N.D.	N.D.	Tr	0.3	N.D.	N.D.	0.4	Tr	3.4	N.D.	N.D.	7
Bahia Tumaco	1113	COBT	N.D.	Tr	N.D.	N.D.	0.3	N.D.	N.D.	N.D.	N.D.	Tr	0.3	0.3	Tr	1.6
Playa Bique	1060	PABI	N.D.	N.D.	3.04	3.47	N.D.	1	5.8	N.D.	8.3	3.7	7.4	10	N.D.	13
Punta Chame	1064	PAPC	Tr	N.D.	Tr	N.D.	Tr	N.D.	Tr	N.D.	N.D.	N.D.	Tr	N.D.	N.D.	1.3

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	PCB 8 CL2	PCB 18 CL3	PCB 28 CL3	PCB 31	PCB 44 CL4	PCB 49	PCB 52 CL4	PCB 66 CL4	PCB 101 CL5	PCB 105 CL5	PCB 110 77 CL5	*PCB 118 108 (149)	PCB 128 CL6	PCB 138 CL6
Golfito	1082	CRGO	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Golfito	1083A	CRGO	Tr	Tr	0.3	N.D.	0.4	Tr	0.4	Tr	0.5	Tr	1.2	Tr	Tr	1.7
Golfito	1083B	CRGO	Tr	N.D.	0.4	N.D.	0.5	Tr	0.3	N.D.	0.7	Tr	1	Tr	Tr	1.5
Golfito	1085	CRGO	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.7	N.D.	0.4	N.D.	0.9	0.8	Tr	2.5
Punta Zancudo	1090	CRPZ	N.D.	N.D.	1.35	1.26	N.D.	0.42	1.73	N.D.	2.97	1.95	3.56	3.5	N.D.	5.85
Estero Jicaral	1072	CREJ	N.D.	N.D.	Tr	N.D.	0.3	Tr	0.3	Tr	N.D.	N.D.	0.8	0.4	N.D.	0.8
Isla Paloma	1075	CRIP	Tr	N.D.	N.D.	N.D.	Tr	N.D.	Tr	Tr	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Estero Cocoroca	1077	CREC	Tr	N.D.	N.D.	N.D.	Tr	Tr	Tr	N.D.	Tr	Tr	1.6	N.D.	N.D.	0.4
Estero Cocoroca	1078	CREC	N.D.	N.D.	1.01	0.91	N.D.	Tr	1.04	N.D.	0.49	Tr	0.37	0.36	N.D.	0.51
Estero Cocoroca	1079A	CREC	0.3	N.D.	N.D.	N.D.	Tr	N.D.	0.3	N.D.	N.D.	N.D.	0.3	N.D.	N.D.	M.I.
Estero Cocoroca	1079B	CREC	Tr	N.D.	Tr	N.D.	Tr	N.D.	0.3	N.D.	N.D.	N.D.	0.5	N.D.	N.D.	M.I.
Ostional	1070	NIOS	N.D.	N.D.	1.21	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Isla de Aserradores	1066	NIIA	1.4	N.D.	N.D.	N.D.	Tr	0.4	0.4	N.D.	4.1	N.D.	3.5	0.5	3.6	15.2
San Lorenzo	1262	HOGF	N.D.	Tr	N.D.	N.D.	Tr	N.D.	N.D.	N.D.	0.4	Tr	Tr	N.D.	N.D.	1.1
San Lorenzo	1263	HOGF	0.3	N.D.	N.D.	N.D.	Tr	N.D.	N.D.	N.D.	0.3	N.D.	N.D.	N.D.	N.D.	1.7
Puerto La Union	1252	ESGF	N.D.	N.D.	Tr	0.29	N.D.	Tr	Tr	N.D.	<0.02	<0.03	N.D.	Tr	N.D.	Tr
La Libertad	1256	ESLL	0.7	Tr	N.D.	N.D.	Tr	N.D.	Tr	N.D.	0.3	0.6	2	0.3	0.7	1.7
Puerto Madero	1292	MEPM	N.D.	N.D.	0.26	Tr	N.D.	Tr	0.26	N.D.	<0.02	Tr	N.D.	Tr	N.D.	0.4
Bahia Ventosa	1283	MELV	0.7	Tr	Tr	N.D.	N.D.	Tr	Tr	N.D.	0.3	0.5	1.1	0.4	Tr	2.5
Bahia Ventosa	1286	MELV	N.D.	N.D.	Tr	Tr	N.D.	Tr	0.3	N.D.	<0.02	Tr	N.D.	0.49	N.D.	1.11
Puerto Escondido	1289	MEPE	0.5	Tr	N.D.	N.D.	Tr	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.5
Mazatlan	1309	MEMA	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.4	N.D.	0.3	N.D.	N.D.	1.2
Altata-Pabellon	1317	MEAP	0.5	N.D.	N.D.	N.D.	0.3	0.3	Tr	N.D.	0.3	0.6	2.2	0.3	0.4	2.3
Altata-Pabellon	1318	MEAP	N.D.	N.D.	0.4	0.52	N.D.	Tr	0.56	N.D.	0.46	<0.04	N.D.	0.36	N.D.	0.47

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	PCB 8 CL2	PCB 18 CL3	PCB 28 CL3	PCB 31	PCB 44 CL4	PCB 49	PCB 52 CL4	PCB 66 CL4	PCB 101 CL5	PCB 105 CL5	PCB 110 77 CL5	*PCB 118 108 (149)	PCB 128 CL6	PCB 138 CL6
San Felipe	1305	MESF	0.6	N.D.	0.5	N.D.	Tr	N.D.	N.D.	N.D.	0.3	Tr	2.2	N.D.	Tr	3
San Carlos	1307	MESC	Tr	0.3	N.D.	N.D.	Tr	N.D.	N.D.	0.3	N.D.	N.D.	0.6	0.5	N.D.	2.2
Ensenada	1303	MEEN	N.D.	N.D.	1.4	N.D.	0.5	0.5	0.6	N.D.	0.5	N.D.	6.6	1	0.5	2.6
Ensenada	1304	MEEN	N.D.	N.D.	0.34	Tr	N.D.	Tr	Tr	N.D.	0.79	0.46	N.D.	N.A.	N.D.	2.46
Punta Banderas	1301A	MEPB	INT.	Tr	Tr	N.D.	0.6	N.D.	1.2	0.4	1.4	N.D.	2.9	1.2	0.6	4.8
Punta Banderas	1301B	MEPB	INT.	Tr	0.3	N.D.	0.8	N.D.	1.4	0.3	1.5	N.D.	4	1.5	0.6	4.8
Deer Island	1401	DI119	0.3	1.7	7.4	N.D.	7.1	N.D.	13	8.9	24.6	10.6	34.3	27.2	7.3	40
Deer Island	1402	DI227	1.5	1.5	7.5	N.D.	9	N.D.	16.6	10	28.4	13.6	39.4	32.3	7.6	46.9
Deer Island	1403	DI530	0.7	2.5	10.3	N.D.	10.6	N.D.	20	12.2	34.5	15.4	45.2	35.1	8.6	53.8
Staten Island	1404	SITXA	N.D.	2.6	8.6	N.D.	20.5	N.D.	41.3	20.5	59.7	20.3	78.5	55.5	10.6	77.8
Staten Island	1405	SITXB	N.D.	2.5	10.1	N.D.	20.6	N.D.	39.5	23.2	61.2	19.2	80.1	58.1	11	77.9
Staten Island	1406	SITXC	N.D.	2.3	10.5	N.D.	21.5	N.D.	42.4	22.1	62.2	21	83.9	62	11.8	82.4
GERG Blank	1408	BLTX1	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	Tr	Tr	Tr	Tr	0.5	Tr	Tr	Tr
Deer Island	1409	DI179	N.D.	N.D.	6.27	5.17	N.D.	3.12	8.37	N.D.	16.1	9.92	N.D.	27.4	N.D.	31.9
Deer Island	1410	DI293	N.D.	N.D.	6.42	5.19	N.D.	4.75	12.6	N.D.	23.4	15	N.D.	29.7	N.D.	35
Deer Island	1411	DI492	N.D.	N.D.	5.13	4.86	N.D.	3.16	8.82	N.D.	25.4	10.4	N.D.	27.6	N.D.	33.7
Unknown	1413	XXMN	N.D.	N.D.	6.9	6.59	N.D.	6.72	16.5	N.D.	18	36.6	N.D.	36.7	N.D.	48.7
ILMR Blank NIST	1415	NISTMN	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 1	1416	BLMN1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	400	N.D.	200	N.D.	N.D.	N.D.	N.D.	N.D.
GERG Blank 2	1417	BLTX2	N.D.	N.D.	Tr	N.D.	Tr	Tr	Tr	N.D.	Tr	N.D.	N.D.	0.3	N.D.	0.9
GERG Blank 3	1418	BLTX3	N.D.	N.D.	N.D.	N.D.	Tr	Tr	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
GERG Blank 4	1419	BLTX4	N.D.	N.D.	Tr	N.D.	0.3	0.3	0.3	N.D.	Tr	N.D.	1	N.D.	N.D.	Tr
GERG Blank 5	1420	BLTX5	N.D.	N.D.	0.4	N.D.	0.4	0.5	0.4	0.4	0.4	0.4	0.7	0.6	Tr	1.6
GERG Blank 6	1421	BLTX6	Tr	N.D.	Tr	N.D.	Tr	Tr	Tr	Tr	Tr	Tr	Tr	Tr	N.D.	0.6
NOAA QA	1422	NOMN1A	1.81	1.04	9.07	N.D.	<0.08	N.D.	18.8	13	32	23.5	N.D.	58.8	12.3	68.1
NOAA QA	1423	NOMN1B	1.75	1.23	10.2	N.D.	<0.08	N.D.	17.5	12.2	29	23.4	N.D.	57.5	14	66.7
NOAA QA	1424	NOMN1C	1.53	0.97	9.82	N.D.	<0.08	N.D.	17.3	11.9	31	23.8	N.D.	61.7	12.7	72.6
NOAA QA	1425	NOMN2	1.72	1.02	10.7	N.D.	<0.08	N.D.	18	12.6	32.6	24	N.D.	60.8	12.5	73

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	PCB 8 CL2	PCB 18 CL3	PCB 28 CL3	PCB 31	PCB 44 CL4	PCB 49	PCB 52 CL4	PCB 66 CL4	PCB 101 CL5	PCB 105 CL5	PCB 110 77 CL5	*PCB 118 108 (149)	PCB 128 CL6	PCB 138 CL6
NOAA QA	1426	NOMN3	1.81	1.19	9.15	N.D.	<0.08	N.D.	15.5	10.9	30.7	28.8	N.D.	62.5	15.9	71.1
ILMR Blank 2	1427	BLMN2	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 3	1428	BLMN3	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 4	1429	BLMN4	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 5	1430	BLMN5	N.D.	N.D.	N.D.	N.D.	N.D.	90	340	N.D.	190	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 6	1431	BLMN6	N.D.	N.D.	N.D.	N.D.	N.D.	116	560	N.D.	340	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 7	1432	BLMN7	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
ILMR Blank 8	1433	BLMN8	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
NOAA QA74	1434	NOTX1A	N.D.	16	83.1	N.D.	65.6	N.D.	109.4	114.6	126.2	53.3	N.D.	133.2	19	119.3
NOAA QA74	1435	NOTX1B	N.D.	12.1	60.7	N.D.	56.7	N.D.	92.3	87.4	106.1	39.7	N.D.	114.2	14.6	103.6
NOAA QA74	1436	NOTX1C	N.D.	1.3	55.7	N.D.	52.3	N.D.	83.4	87.2	100.3	34.9	N.D.	103.1	14.1	95.9
NOAA QA74	1437	NOTX1D	N.D.	23.7	120.9	N.D.	80.7	N.D.	114.4	122.6	127.2	68.5	N.D.	143.4	22.4	143.4
NOAA QA74	1438	NOTX1E	N.D.	22.1	163.3	N.D.	75.3	N.D.	111.5	116.6	124.6	60.7	N.D.	134.1	20.3	134.8
NOAA QA74	1439	NOTX1F	N.D.	17.6	87.2	N.D.	67.6	N.D.	109.3	111.7	127	58	N.D.	131.7	20.4	122.4
NOAA QA74	1440	NOTX1G	N.D.	17.8	72.7	N.D.	70.1	N.D.	112.7	121.6	135.4	54.3	N.D.	133.8	19.8	149.7
GERG Blank 7	1441	BLTX7	N.D.	N.D.	0.3	N.D.	Tr	0.3	0.3	N.D.	0.4	N.D.	2.6	N.D.	N.D.	0.4
GERG Blank 8	1442	BLTX8	N.D.	N.D.	N.D.	N.D.	Tr	0.3	0.3	N.D.	0.3	Tr	2.1	Tr	N.D.	0.3
NOAA QA92	1443	NOTX2A	2.4	8.7	51.1	N.D.	39	N.D.	58.6	56.4	89.2	35.4	135.7	83.5	13.8	103.3
NOAA QA92	1444	NOTX2B	2.5	10.8	55.3	N.D.	43.5	N.D.	61.8	64.9	94	44.6	149	98.4	14.6	112.4
NOAA QA92	1445	NOTX2C	2.2	11.2	56.1	N.D.	42.1	N.D.	62.9	60.3	97.2	45.7	147.8	94.4	15.1	113.8
NOAA QA92	1446	NOTX2D	1.7	10.8	52.5	N.D.	44.1	N.D.	63.5	65.6	95.2	48.3	151.4	99.3	16.7	117.2
NOAA QA92	1447	NOTX2E	1.8	11.3	57.9	N.D.	44.3	N.D.	65.2	52.6	99.1	43.5	152.6	100	15.4	114.8
Staten Island	1448	SIMNA	N.D.	N.D.	8.66	8.38	N.D.	4.05	21.6	N.D.	36.5	19.7	N.D.	39.3	N.D.	48.3
Staten Island	1449	SIMNB	N.D.	N.D.	10.5	9.77	N.D.	5.86	22.8	N.D.	42.7	16.9	N.D.	41.8	N.D.	47
Staten Island	1450	SIMNC	N.D.	N.D.	9.77	9.16	N.D.	4.77	18	N.D.	37.3	15	N.D.	37.9	N.D.	42.9

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	PCB 149	PCB 153 CL6	PCB 170 CL7	PCB 180 CL7	PCB 187 182 159	PCB 189	PCB 195 CL8	PCB 206 CL9	PCB 209 CL10
Laguna Madre	1297	MELM	1.9	5.5	2.8	N.D.	2.1	1.3	1.3	1.1	1.3
Tampico	1293	META	2.2	4.6	N.D.	Tr	3.2	N.D.	N.D.	N.D.	N.D.
Laguna de Ostion	1279	MELO	N.D.	3.8	N.D.	N.D.	1.5	N.D.	N.D.	N.D.	N.D.
Laguna de Ostion	1280	MELO	3.21	6.03	N.D.	Tr	N.D.	Tr	N.D.	N.D.	I.S.
Laguna de Términos	1275	MELT	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	N.D.	N.D.	N.D.
Belize City	1258	BEBC	3.42	3.6	N.D.	Tr	N.D.	0.34	N.D.	N.D.	I.S.
La Ceiba	1260	HOLC	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Tortuguero	1148	CRTO	N.D.	N.D.	N.D.	Tr	N.D.	N.D.	N.D.	N.D.	N.D.
Puerto Almirante	1092	PAPA	0.3	0.5	N.D.	Tr	0.4	N.D.	0.3	N.D.	N.D.
Portobelo	1057	PAPB	N.D.	N.D.	0.3	1.1	Tr	N.D.	Tr	Tr	N.D.
Bahia de Cartagena	1096	COBC	N.D.	N.D.	N.D.	0.9	N.D.	N.D.	N.D.	N.D.	N.D.
Bahia de Cartagena	1098	COBC	N.D.	0.7	N.D.	Tr	Tr	N.D.	N.D.	N.D.	N.D.
Cienaga Grande	1100	COCG	N.D.	Tr	N.D.	Tr	Tr	N.D.	N.D.	Tr	Tr
Cienaga Grande	1102	COCG	0.58	0.68	N.D.	Tr	N.D.*	<0.02	N.D.	N.D.	I.S.
Commander's Bay	1142	ARCB	44.4	88.7	7	16.7	30.2	Tr	1.2	1.1	0.9
Morrocoy	1122	VEMO	0.3	0.31	N.D.	<0.04	N.D.	Tr	N.D.	N.D.	I.S.
Paparo	1116	VEPA	4.4	9.1	3.7	6	3.8	Tr	0.4	Tr	N.D.
Cumana	1130	VECU	0.3	0.9	0.4	0.6	0.3	N.D.	0.3	0.3	0.5
Caroni Swamp	1132	TRCS	0.6	1.1	Tr	0.5	Tr	N.D.	Tr	N.D.	N.D.
Caroni Swamp	1134	TRCS	0.75	1.51	N.D.	0.81	N.D.	Tr	N.D.	N.D.	I.S.
Southern Range	1136A	TRSR	N.D.	0.7	N.D.	Tr	Tr	Tr	N.D.	N.D.	N.D.
Southern Range	1136B	TRSR	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Bowden	1267	JABO	N.D.	0.5	N.D.	N.D.	0.3	N.D.	0.5	Tr	Tr

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	PCB 149	PCB 153 CL6	PCB 170 CL7	PCB 180 CL7	PCB 187 182 159	PCB 189	PCB 195 CL8	PCB 206 CL9	PCB 209 CL10
Bowden	1268	JABO	Tr	0.83	N.D.	0.65	N.D.	Tr	N.D.	N.D.	I.S.
Port Royal	1272	JAPR	1.5	Tr	N.D.	N.D.	Tr	N.D.	N.D.	N.D.	N.D.
Cayo Culebra	1313	CUCC	N.D.	N.D.	N.D.	0.7	N.D.	N.D.	Tr	N.D.	N.D.
Cayo Culebra	1314	CUCC	Tr	0.63	N.D.	0.41	N.D.	Tr	N.D.	N.D.	N.D.
Bragança	1182	BRBR	Tr	Tr	N.D.	<0.04	N.D.	<0.02	N.D.	N.D.	I.S.
Sao Luis	1177	BRSL	0.3	0.3	N.D.	0.3	N.D.	N.D.	N.D.	N.D.	N.D.
Fortaleza	1171	BRFO	0.4	3.6	N.D.	N.D.	0.7	N.D.	0.7	Tr	N.D.
Fortaleza	1175	BRFO	0.5	1	0.8	1	N.D.	N.D.	0.5	0.7	N.D.
Fortaleza	1176	BRFO	0.76	1.94	N.D.	0.95	N.D.	<0.02	N.D.	N.D.	I.S.
Recife	1163	BRRE	4.7	11.4	0.5	1.9	1.4	Tr	0.4	0.3	1.5
Recife	1164	BRRE	2.73	2.46	N.D.	0.4	N.D.	<0.02	N.D.	N.D.	I.S.
Recife	1167	BRRE	6.8	16.8	0.6	1.9	2.1	N.D.	0.5	0.7	0.4
Lagoa Mundaú	1170	BRLM	2.01	2	N.D.	0.38	N.D.	Tr	N.D.	N.D.	I.S.
Salvador	1159	PABI	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Salvador	1161	BRSA	Tr	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Salvador	1162	BRSA	N.D.	Tr	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Vitoria	1183A	BRVI	1.7	13.9	1.7	2	3.7	N.D.	0.4	N.D.	0.6
Vitoria	1183B	BRVI	1.9	15.3	2.1	2.2	3.6	N.D.	0.4	N.D.	N.D.
Cabo Frio	1187	BRCF	N.D.	2.7	N.D.	2.8	N.D.	N.D.	N.D.	N.D.	N.D.
Cabo Frio	1190	BRCF	0.46	0.7	N.D.	0.3	N.D.	0.3	N.D.	N.D.	I.S.
Bahía Guanabara	1193	BRGB	4.3	13.1	N.D.	5	2.6	N.D.	Tr	0.4	Tr
Bahía Guanabara	1194	BRGB	6.4	8.15	N.D.	3.1	N.D.	Tr	N.D.	N.D.	I.S.
Santos	1153	BRSB	1.6	4.4	1.7	2.1	1.6	N.D.	N.D.	0.3	Tr
Santos	1154	BRSB	2.02	4.07	N.D.	1.56	N.D.	<0.02	N.D.	N.D.	I.S.
Bahía Paranagua	1195	BRPB	0.6	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

Site	ID	Code	PCB 149	PCB 153 CL6	PCB 170 CL7	PCB 180 CL7	PCB 187 182 159	PCB 189	PCB 195 CL8	PCB 206 CL9	PCB 209 CL10
Bahía Paranagua	1198	BRPB	Tr	0.77	N.D.	Tr	N.D.	<0.02	N.D.	N.D.	I.S.
Lagoa dos Patos	1199	BRLP	1.8	1.2	0.7	1.2	1.3	Tr	N.D.	N.D.	N.D.
Lagoa dos Patos	1202	BRLP	0.91	1.3	N.D.	0.6	N.D.	Tr	N.D.	N.D.	I.S.
Punta del Este	1014	URPE	5.35	11	N.D.	3.6	N.D.	Tr	N.D.	N.D.	I.S.
Santa Lucia	1020	URSL	1.2	19.2	N.D.	3	2.4	N.D.	0.7	1.6	N.D.
Hudson	1002	ARHU	180	290	N.D.	34	N.D.	<0.02	N.D.	N.D.	I.S.
Hudson	1004	ARHU	224.5	611.3	33.8	69.3	78.9	N.D.	5.6	N.D.	N.D.
Atalaya	1008	ARAT	106.5	337.2	15.4	54	51.3	0.5	2.5	0.8	0.9
Mar del Plata	1024	ARMP	N.D.	N.D.	Tr	N.D.	0.3	N.D.	N.D.	N.D.	N.D.
Pehuen-co	1027A	ARPC	0.5	N.D.	N.D.	N.D.	0.5	N.D.	N.D.	N.D.	N.D.
Pehuen-co	1027B	ARPC	0.6	N.D.	N.D.	N.D.	0.6	N.D.	N.D.	N.D.	N.D.
Arroyo Parejas	1029	ARAP	7.3	13.4	Tr	0.9	2.3	N.D.	Tr	N.D.	Tr
Rawson	1033	ARRA	0.3	1.3	N.D.	1.2	Tr	N.D.	N.D.	N.D.	N.D.
Bahia Camarones	1037	ARCA	N.D.	1.2	N.D.	0.6	N.D.	N.D.	Tr	Tr	N.D.
Bahia Camarones	1040	ARCA	N.D.	0.5	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Bahia Camarones	1042	ARCA	<0.02	0.68	N.D.	<0.04	N.D.	<0.02	N.D.	N.D.	I.S.
Bahia Camarones	1043	ARCA	N.D.	2.7	1.7	2.4	1.5	N.D.	1.6	1.5	1.1
Punta Loyola	1052	ARPL	Tr	1.5	0.3	0.8	1.5	N.D.	0.7	N.D.	1.1
Ushuaia	1046	ARUS	1.63	2.9	N.D.	0.53	N.D.	<0.02	N.D.	N.D.	I.S.
Punta Arenas	1209	CHPA	12.8	25.6	0.9	3.8	6.1	N.D.	Tr	N.D.	N.D.
Punta Arenas	1211	CHPA	12	22.6	1.3	4.1	5.9	N.D.	Tr	Tr	N.D.
Punta Arenas	1212	CHPA	15.62	18.8	N.D.	4.44	N.D.	Tr	N.D.	N.D.	I.S.
Punta Arenas	1213	CHPA	17.4	35.6	6.6	15.2	10.1	Tr	0.9	0.8	N.D.
Puerto Montt	1203	CHPM	N.D.	Tr	N.D.	Tr	N.D.	N.D.	N.D.	N.D.	N.D.
Puerto Montt	1205	CHPM	2	0.7	N.D.	N.D.	1.1	N.D.	0.3	N.D.	N.D.

Site	ID	Code	PCB 149	PCB 153 CL6	PCB 170 CL7	PCB 180 CL7	PCB 187 182 159	PCB 189	PCB 195 CL8	PCB 206 CL9	PCB 209 CL10
Puerto Montt	1206	CHPM	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	Tr	N.D.	N.D.
Puerto Montt	1208	CHPM	0.47	0.43	N.D.	0.31	N.D.	<0.02	N.D.	N.D.	I.S.
Concepcion	1229	CHCO	0.4	1	N.D.	Tr	Tr	N.D.	Tr	0.4	N.D.
Concepcion	1231	CHCO	0.4	2.6	N.D.	0.6	0.5	N.D.	N.D.	N.D.	N.D.
Concepcion	1234	CHCO	1.25	0.43	N.D.	<0.04	N.D.	<0.02	N.D.	N.D.	I.S.
Valparaiso	1216	CHVA	7.32	11.5	N.D.	Tr	N.D.	<0.02	N.D.	N.D.	I.S.
LA Serena	1217	CHLS	N.D.	0.5	N.D.	Tr	N.D.	N.D.	N.D.	N.D.	N.D.
LA Serena	1218	CHLS	<0.02	Tr	N.D.	0.25	N.D.	Tr	N.D.	N.D.	I.S.
Antofagasta	1228	CHAN	1.72	1.46	N.D.	0.81	N.D.	Tr	N.D.	N.D.	I.S.
Arica	1222	CHAR	0.58	1.28	N.D.	Tr	N.D.	<0.02	N.D.	N.D.	I.S.
Arica	1225A	CHAR	0.3	1.5	N.D.	Tr	N.D.	N.D.	N.D.	N.D.	N.D.
Arica	1225B	CHAR	0.4	1.3	N.D.	0.4	Tr	N.D.	N.D.	N.D.	N.D.
Paracas	1239	PEPA	0.7	1.9	N.D.	0.8	0.7	N.D.	N.D.	N.D.	N.D.
Paracas	1240	PEPA	1.95	2.29	N.D.	0.86	N.D.	<0.02	N.D.	N.D.	I.S.
Paracas	1241	PEPA	0.4	1.5	N.D.	N.D.	0.4	N.D.	N.D.	N.D.	N.D.
Paracas	1242	PEPA	1.52	2.28	N.D.	<0.04	N.D.	<0.02	N.D.	N.D.	I.S.
Callao	1235A	PECA	7.8	18.2	1.7	5.2	4.6	N.D.	N.D.	N.D.	N.D.
Callao	1235B	PECA	8.9	21	2.1	5.9	5.3	Tr	Tr	N.D.	N.D.
Guayaquil	1244	ECGU	2.19	1.85	N.D.	1.65	N.D.	<0.03	N.D.	N.D.	I.S.
Río Chone	1247	ECCR	Tr	Tr	N.D.	0.6	N.D.	N.D.	0.5	0.8	0.8
Río Chone	1248	ECCR	0.35	0.32	N.D.	Tr	N.D.	<0.02	N.D.	N.D.	I.S.
Río Chone	1249	ECCR	Tr	N.D.	Tr	Tr	N.D.	N.D.	N.D.	N.D.	N.D.
Bahia Tumaco	1107	COBT	Tr	0.3	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Bahia Tumaco	1110	COBT	0.6	0.66	N.D.	0.34	N.D.	<0.02	N.D.	N.D.	I.S.
Bahia Tumaco	1111	COBT	Tr	N.D.	N.D.	N.D.	N.D.	Tr	N.D.	N.D.	N.D.
Bahia Tumaco	1113	COBT	N.D.	N.D.	Tr	1.2	N.D.	N.D.	Tr	Tr	Tr
Playa Bique	1060	PABI	6.77	13	N.D.	3.1	N.D.	0.7	N.D.	N.D.	I.S.
Punta Chame	1064	PAPC	N.D.	Tr	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

Int'l Mussel Watch - Pesticide & PCB Analysis (ng/gdw, ILMR's Blanks-pg) (Corrected for recoveries)

Site	ID	Code	PCB 149	PCB 153 CL6	PCB 170 CL7	PCB 180 CL7	PCB 187 182 159	PCB 189	PCB 195 CL8	PCB 206 CL9	PCB 209 CL10
Golfito	1082	CRGO	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Golfito	1083A	CRGO	0.4	0.9	N.D.	0.3	Tr	N.D.	N.D.	N.D.	N.D.
Golfito	1083B	CRGO	0.4	0.8	N.D.	0.3	Tr	N.D.	N.D.	N.D.	N.D.
Golfito	1085	CRGO	N.D.	N.D.	N.D.	0.6	N.D.	N.D.	N.D.	Tr	N.D.
Punta Zancudo	1090	CRPZ	4.34	6.22	N.D.	1.13	N.D.	Tr	N.D.	N.D.	I.S.
Estero Jicaral	1072	CREJ	Tr	0.3	N.D.	0.7	N.D.	N.D.	N.D.	N.D.	N.D.
Isla Paloma	1075	CRIP	N.D.	Tr	N.D.	Tr	Tr	N.D.	N.D.	N.D.	N.D.
Estero Cocoroca	1077	CREC	Tr	0.3	N.D.	Tr	N.D.	N.D.	N.D.	N.D.	N.D.
Estero Cocoroca	1078	CREC	0.32	0.79	N.D.	<0.04	N.D.	<0.02	N.D.	N.D.	I.S.
Estero Cocoroca	1079A	CREC	Tr	Tr	Tr	N.D.	N.D.	Tr	N.D.	N.D.	N.D.
Estero Cocoroca	1079B	CREC	Tr	Tr	Tr	N.D.	N.D.	Tr	N.D.	N.D.	N.D.
Ostional	1070	NIOS	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Isla de Aserradores	1066	NIIA	11.9	2.8	N.D.	N.D.	2.7	Tr	N.D.	N.D.	Tr
San Lorenzo	1262	HOGF	0.4	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	Tr
San Lorenzo	1263	HOGF	0.4	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Puerto La Union	1252	ESGF	0.29	Tr	N.D.	<0.04	N.D.	<0.02	N.D.	N.D.	I.S.
La Libertad	1256	ESLL	0.8	1.4	N.D.	Tr	0.3	N.D.	N.D.	N.D.	N.D.
Puerto Madero	1292	MEPM	0.69	0.36	N.D.	0.33	N.D.	<0.02	N.D.	N.D.	I.S.
Bahia Ventosa	1283	MELV	1.4	1.8	N.D.	0.7	0.7	N.D.	N.D.	N.D.	N.D.
Bahia Ventosa	1286	MELV	0.5	1.55	N.D.	1.17	N.D.	<0.02	N.D.	N.D.	I.S.
Puerto Escondido	1289	MEPE	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Mazatlan	1309	MEMA	N.D.	1	N.D.	0.4	Tr	N.D.	N.D.	Tr	N.D.
Altata-Pabellon	1317	MEAP	1.2	1.5	N.D.	Tr	0.6	N.D.	N.D.	N.D.	Tr
Altata-Pabellon	1318	MEAP	0.9	0.53	N.D.	Tr	N.D.	<0.03	N.D.	N.D.	I.S.

Site	ID	Code	PCB 149	PCB 153 CL6	PCB 170 CL7	PCB 180 CL7	PCB 187 182 159	PCB 189	PCB 195 CL8	PCB 206 CL9	PCB 209 CL10
San Felipe	1305	MESF	0.7	0.4	N.D.	Tr	Tr	N.D.	N.D.	N.D.	N.D.
San Carlos	1307	MESC	N.D.	0.8	N.D.	0.4	N.D.	N.D.	N.D.	Tr	Tr
Ensenada	1303	MEEN	0.7	0.8	0.4	Tr	1.1	N.D.	N.D.	N.D.	N.D.
Ensenada	1304	MEEN	N.A	2.61	N.D.	0.61	N.D.	Tr	N.D.	N.D.	I.S.
Punta Banderas	1301A	MEPB	0.6	7	N.D.	8.6	4.5	N.D.	Tr	N.D.	N.D.
Punta Banderas	1301B	MEPB	0.9	7.1	N.D.	8	4.6	N.D.	N.D.	N.D.	N.D.
Deer Island	1401	DI119	N.D.	47.7	1.8	4.3	11.6	N.D.	Tr	Tr	0.9
Deer Island	1402	DI227	N.D.	54.2	1.9	4.8	13.8	N.D.	0.3	Tr	0.7
Deer Island	1403	DI530	N.D.	56.7	2.8	5.3	14.7	N.D.	0.6	0.6	1.1
Staten Island	1404	SITXA	N.D.	101.7	3.6	15.9	26.9	N.D.	0.4	0.3	Tr
Staten Island	1405	SITXB	N.D.	109.6	3.5	16.8	28.5	N.D.	0.4	Tr	Tr
Staten Island	1406	SITXC	N.D.	104.5	3.5	17.6	28.9	N.D.	0.5	0.3	Tr
GERG Blank	1408	BLTX1	N.D.	0.3	N.D.	Tr	Tr	N.D.	Tr	Tr	Tr
Deer Island	1409	DI179	20.9	35.7	N.D.	3.33	N.D.	0.71	N.D.	N.D.	I.S.
Deer Island	1410	DI293	23.2	39.3	N.D.	5.26	N.D.	Tr	N.D.	N.D.	I.S.
Deer Island	1411	DI492	16.2	36.2	N.D.	3.25	N.D.	Tr	N.D.	N.D.	I.S.
Unknown	1413	XXMN	22.8	27.6	N.D.	11.5	N.D.	1.56	N.D.	N.D.	I.S.
ILMR Blank NIST	1415	NISTMN	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	I.S.
ILMR Blank 1	1416	BLMN1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	I.S.
GERG Blank 2	1417	BLTX2	Tr	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
GERG Blank 3	1418	BLTX3	Tr	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
GERG Blank 4	1419	BLTX4	Tr	N.D.	N.D.	N.D.	Tr	N.D.	N.D.	N.D.	N.D.
GERG Blank 5	1420	BLTX5	Tr	0.5	N.D.	Tr	Tr	N.D.	N.D.	N.D.	N.D.
GERG Blank 6	1421	BLTX6	Tr	Tr	N.D.	Tr	Tr	N.D.	N.D.	N.D.	N.D.
NOAA QA	1422	NOMN1A	N.D.	67.7	<0.12	6.56	18.6	N.D.	6.01	<0.2	I.S.
NOAA QA	1423	NOMN1B	N.D.	70	<0.12	8.66	18.7	N.D.	7.01	<0.2	I.S.
NOAA QA	1424	NOMN1C	N.D.	74.9	<0.12	6.85	18.8	N.D.	7.01	<0.2	I.S.
NOAA QA	1425	NOMN2	N.D.	74.7	<0.12	6.77	18.6	N.D.	6.87	<0.2	I.S.

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NOAA QA	1426	NOMN3	N.D.	72.9	<0.12	8.87	20.8	N.D.	5.84	<0.2	I.S.
ILMR Blank 2	1427	BLMN2	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	I.S.
ILMR Blank 3	1428	BLMN3	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	I.S.
ILMR Blank 4	1429	BLMN4	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	I.S.
ILMR Blank 5	1430	BLMN5	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	I.S.
ILMR Blank 6	1431	BLMN6	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	I.S.
ILMR Blank 7	1432	BLMN7	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	I.S.
ILMR Blank 8	1433	BLMN8	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	I.S.
NOAA QA74	1434	NOTX1A	N.D.	144.7	N.D.	15.1	28.5	N.D.	N.D.	N.D.	N.D.
NOAA QA74	1435	NOTX1B	N.D.	129.6	N.D.	12.1	22.7	N.D.	N.D.	N.D.	N.D.
NOAA QA74	1436	NOTX1C	N.D.	123.6	N.D.	10.4	21	N.D.	N.D.	N.D.	N.D.
NOAA QA74	1437	NOTX1D	N.D.	154.9	N.D.	17.9	32.8	N.D.	N.D.	N.D.	N.D.
NOAA QA74	1438	NOTX1E	N.D.	146.3	N.D.	15.6	32.8	N.D.	N.D.	N.D.	N.D.
NOAA QA74	1439	NOTX1F	N.D.	159.9	N.D.	15	28.3	N.D.	N.D.	N.D.	N.D.
NOAA QA74	1440	NOTX1G	N.D.	165.7	N.D.	14.3	28.9	N.D.	N.D.	N.D.	N.D.
GERG Blank 7	1441	BLTX7	Tr	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
GERG Blank 8	1442	BLTX8	Tr	0.3	N.D.	N.D.	Tr	N.D.	N.D.	N.D.	N.D.
NOAA QA92	1443	NOTX2A	N.D.	126.7	N.D.	29.8	25.2	N.D.	N.D.	Tr	0.7
NOAA QA92	1444	NOTX2B	N.D.	130.4	N.D.	33	27.9	N.D.	N.D.	N.D.	0.7
NOAA QA92	1445	NOTX2C	N.D.	128.8	N.D.	32.4	27.8	N.D.	N.D.	N.D.	0.9
NOAA QA92	1446	NOTX2D	N.D.	133.8	N.D.	34	29.7	N.D.	N.D.	N.D.	0.9
NOAA QA92	1447	NOTX2E	N.D.	134.6	N.D.	32.2	27.4	N.D.	N.D.	N.D.	0.8
Staten Island	1448	SIMNA	34	57.5	N.D.	9.46	N.D.	Tr	N.D.	N.D.	I.S.
Staten Island	1449	SIMNB	49.6	56.3	N.D.	8.66	N.D.	Tr	N.D.	N.D.	N.D.
Staten Island	1450	SIMNC	43.1	50.5	N.D.	8.44	N.D.	Tr	N.D.	N.D.	N.D.

Int'l Mussel Watch - Pesticide & PCB Analysis

Footnotes:

B after ID# is duplicate analysis
INT.=interference form contaminating peaks
Tr=trace
N.D.=not detected
AT=acid treatment was necessary
I.S. internal standard
* Congeners 118, 108 and 149 were summed by Mel; GERG only summed 118 and 108

Appendix B

Central Laboratory Analytical Methods

No analytical chemistry standard methods exist for the analysis of complex mixtures of organic contaminants in environmental matrices. The goal of standardized analytical results that can be compared between laboratories (or from day-to-day in a single laboratory) is currently being met by performance-based analysis, where accepted QA/QC practices are incorporated into the standard operating procedures of each laboratory. Several methods and variations of these methods have been published in the scientific literature (see reference list with this appendix). These may be used for analyses of chlorinated hydrocarbon pesticides and PCBs; especially for the extraction and initial separations of the classes of analytes of interest. The methods described in any of these reports may be used as guides for analysts in laboratories in participating countries. Local circumstances including available equipment, chemicals, and solvents, and analytical requirements for other programs in a given laboratory will govern final method selection by each laboratory.

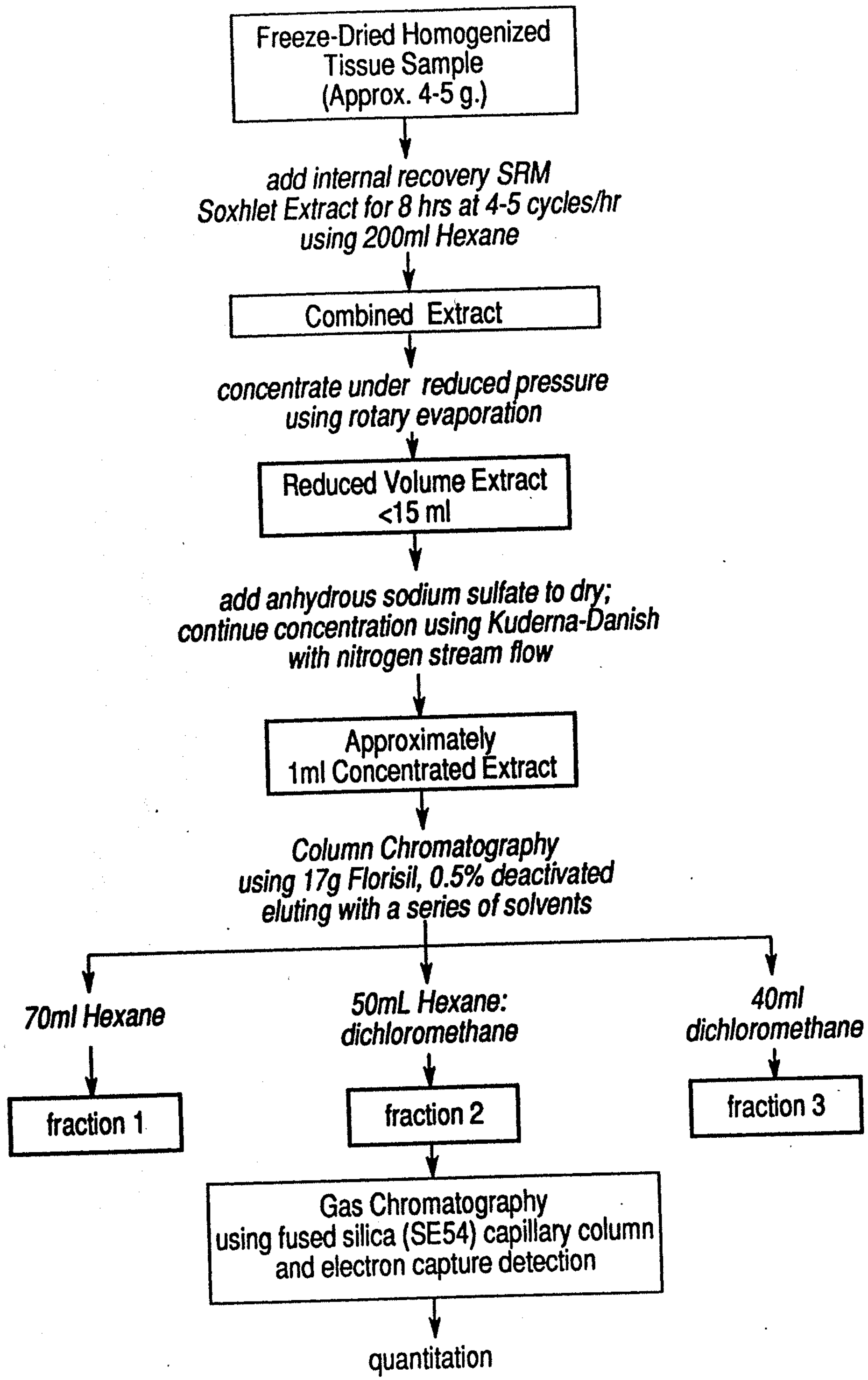
The two IMW Analytical Centers used analytical methods and QA/QC practices that they have developed over time to meet their own needs. While basically similar in design, these two methods differ in detail and are summarized here, and in Figure B-1. The method described in the IMW Manual is an older version, similar to these methods, and is also included for comparison. References which give details of these methods are listed in the reference list at the end of this Appendix.

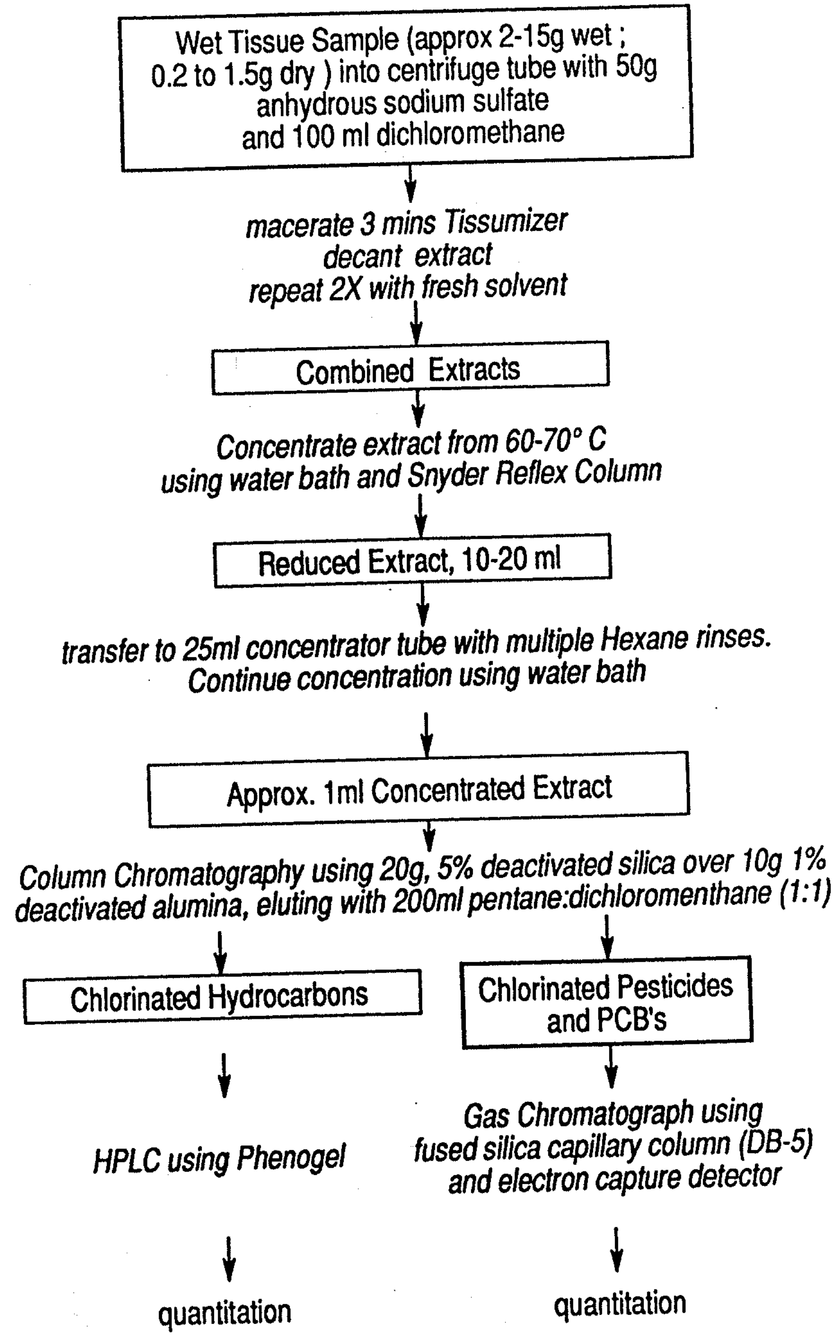
Texas A&M GERG

Methods used by the NOAA Status and Trends Program are modifications to the procedures developed by MacLeod et al (1985) and more recently published in NOAA (1993). Wet tissue is extracted with methylene chloride and combined extracts are chromatographed on silica gel and alumina. The chlorinated hydrocarbon eluant from column chromatography is further seperated by HPLC using a Sephadex LH-20 column. Capillary gas chromatography with electron capture detection is used to seperate and quantify chlorinated hydrocarbons in the mixture. Individual laboratories participating in the NOAA Status and Trends Program have modified this basic procedure.

IAEA Marine Environment Lab

Mel uses the analytical methods described in UNEP (1991), extracting organic matter with hexane in a Soxhlet apparatus, concentrating the extract by Kuderna-Danish concentrator, and purifying the extract on Florisil. Recovery standards are routinely added to the extraction step. Organochlorine compounds are found in two elution fractions from the Florisil


Freeze-Dried Homogenized Tissue Sample (Approx. 4-5 g.)
add internal recovery SRM
Soxhlet Extract for 8 hrs at 4-5 cycles/hr
using 200ml Hexane
Combined Extract
concentrate under reduced pressure
using rotary evaporation
Reduced Volume Extract <15 ml
add anhydrous sodium sulfate to dry;
continue concentration using Kuderna-Danish
with nitrogen stream flow
Approximately 1ml Concentrated Extract
Column Chromatography
using 17g Florisil, 0.5% deactivated
eluting with a series of solvents
70ml Hexane
fraction 1
50mL Hexane: dichloromethane
fraction 2
40ml dichloromethane
fraction 3
Gas Chromatography using fused silica (SE54) capillary column and electron capture detection
quantitation


Wet Tissue Sample (approx 2-15g wet ; 0.2 to 1.5g dry) into centrifuge tube with 50g anhydrous sodium sulfate and 100 ml dichloromethane
macerate 3 mins Tissumizer
decant extract
repeat 2X with fresh solvent
Combined Extracts
Concentrate extract from 60-70° C
using water bath and Snyder Reflex Column
Reduced Extract, 10-20 ml
transfer to 25ml concentrator tube with multiple Hexane rinses.
Continue concentration using water bath
Approx. 1ml Concentrated Extract
Column Chromatography using 20g, 5% deactivated silica over 10g 1%
deactivated alumina, eluting with 200ml pentane:dichloromenthane (1:1)
Chlorinated Hydrocarbons
Chlorinated Pesticides and PCB's
HPLC using Phenogel
Gas Chromatograph using
fused silica capillary column (DB-5)
and electron capture detector
quantitation
quantitation

purification step and these are analyzed by capillary gas chromatography with ECD detection. Analytes of interest are identified by comparison of retention times of authentic standards.

IMW Manual

Lipids are extracted from an aliquot of a sample by solvent extraction, fractionated into classes by adsorption chromatography prepared according to guidelines in UNEP (1991) using hexane or petroleum ether as solvent. Extracts may be treated with concentrated sulphuric acid to destroy some of the interfering lipids and then further cleaned and fractionated into classes of chlorinated hydrocarbons by silica gel adsorption chromatography using known reference substances for identification. Extracts are further seperated into component compounds by capillary gas chromatograpry, and quantification is based on peak signal.

Glassware should be cleaned just before use. All reagents, including distilled water, should be of demonstrated analytical quality and result in adequate signal-to-noise ratio with the electron capture detection. Analytical blanks are run routinely, as are analyses of surrogate spikes. Working solutions from the stock reference solutions are prepared on a regular basis and stored in clean glass vials tightly capped with non-contaminating materials such as teflon or glass. Extreme care must be taken to ensure that standards have not changed their concentrations through solvent evaporation.

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Appendix C

Host Country Interlaboratory QA Comparison Exercise

The need for quality control and intercalibration of analyses for chemical contaminants in environmental samples has been documented numerous times during the past two decades (see References in main report). Some advantages of inter-comparison exercises include:

- create a frame of reference so that data from multiple labs can be used in comprehensive, regional assessments.
- introduce and evaluate advanced analytical methods
- permit self-evaluation by participating laboratories and assist with training new staff
- impose an external incentive to maintain internal quality control programs
- identify variation between laboratories and common sources of error leading to this variation.

A goal of inter-comparison exercises is to reduce the inter-laboratory variation in analytical results. Such exercises are a mutual learning experience and are not a "test" to determine how close any particular analyst comes to the "correct" answer. With sufficient time and funding, a step-wise inter-calibration exercise would sequentially include:

- a) analysis of standard solutions,
- b) check of participants ability to prepare quantitative standard mixtures,
- c) analysis of cleaned extracts,
- d) analysis of whole extracts (no clean-up), and finally
- e) analysis of environmental samples.

In the small interlaboratory comparison exercise initiated by the Project Secretariat, we jumped directly to step "e" because of time and funding constraints. We did this in anticipation that further iterations of this collaborative effort based on the results of this exercise would continue and be supported by additional funding.

The Project Secretariat distributed selected quality assurance (QA) Standard Reference Materials (Table C1) to all Host-Country scientists who retained International Mussel Watch samples for analysis in their own labs. The Standard Reference Materials (SRMs) are listed on Table C1 and included internal recovery standards, quantitation standards for GC, two quantitative pesticide mixtures, a commercial PCB solution and a Florosil column elution standard. In addition to the SRMs, we also included a freeze-dried homogenized mussel tissue. As we did not know the specific analytical methods being used in each lab, we distributed SRMs of general utility for contaminant analysis. We encouraged each participating analyst to report their own results (i.e., TABLE: C1 International Mussel Watch Standard Reference Materials Distributed to Host-Country Scientists for Interlaboratory Comparison Exercise.

1. Florosil Column Check
   2,4,5-Trichlorophenol, (1 ml @200μg/ml)

2. Internal Recovery Standard
   Tetrachloro-m-xylene & Decachlorobiphenyl, (1 ml @200μg/ml)

3. GC Quantitation Standards
   Pentachlorobenzene, (@100μg/ml)
   Octachloronaphthalene

4. Pesticide Mix A
   alpha-BHC (5 μg/ml)
   Heptachlor (5 μg/ml)
   gamma-BHC (Lindane) (5 μg/ml)
   Endosulfan I (5 μg/ml)
   Dieldrin (10 μg/ml)
   Endrin (10 μg/ml)
   p,p'-DDD (10 μg/ml)
   p,p'-DDT (10 μg/ml)
   Methoxychlor (50 μg/ml)

5. Pesticide Mix B
   beta-BHC (5 μg/ml)
   delta-BHC (5 μg/ml)
   Aldrin (5 μg/ml)
   Heptachlor Epoxide (5 μg/ml)
   Chlordane (alpha) (5 μg/ml)
   Chlordane (gamma) (5 μg/ml)
   p,p'-DDE (10 μg/ml)
   Endosulfan Sulfate (10 μg/ml)
   Endrin Aldehyde (10 μg/ml)
   Endrin Ketone (10 μg/ml)
   Endosulfan II (10 μg/ml)

6. Aroclor 1254,
   (1 ml @200μg/ml)

analyses of bivalve tissue and QA sample) to the Project Secretariat. Participation in this exercise was voluntary, but we emphasized that in order to create a future regional database from the results of combined analytical efforts, intercomparison exercises were essential.

We requested that each analyst use the analytical method currently in use in his/her lab and report the analytes normally reported. In addition, we asked that complete analytical results including QA information listed below, be included in addition to analyte concentrations. Such information, is essential for one laboratory's data to be compared with that from other laboratories.

QA Information requested:

- sample weight (report dry weight and how derived)
- extract weight (total lipid)
- SRM recovery spikes used and amount spiked per sample
- % recovery (include how calculated)

Note: recovery data from other (i.e., non-IMW) tissue analyses run in each lab was requested as well, if available. We anticipated the analysis of one internal recovery spike in the triplicate analysis of freeze-dried tissue homogenate.

- lab blank results (and lab limit of detection)
- sample injection volume, total sample volume (gc)
- quantification calculations, including total amount of analyte concentration relative to extracted tissue
- a copy of the analytical method used

A total of 12 Host-Country laboratories retained IMW-collected tissue samples for analysis at the time of the visit of the IMW Field Scientist. All of these laboratories received a collection of Standard Reference Materials (SRM's) and a freeze-dried tissue from the Project Secretariat along with instructions for reporting results. Six labs have reported analyte concentration data in the freeze-dried sample supplied to the Project Secretariat. The total number of reported analytes and the specific analytes reported by any single lab varied greatly, as did the level of detail of methodology and quality assurance data. For these reasons, a complete discussion of this data, as is presented in the body of this report is not possible. A summary of the data is presented in Table C2.

Given that the IMW Host Country interlaboratory comparison exercise began at the final step of the ideal iterative exercise described above, the results are encouraging and should cause the participating analysts to look forward to future exercises. Variations in the reported results cannot be explained here because insufficient analytical detail was available to make valid comparisons.

Some data on organic contaminant concentrations in environmental samples from the IMW Initial Phase Region has been published and selected reports are cited in the reference section of

TABLE C2. Results of Host-Country Scientist Interlaboratory Comparison Exercise; Initial Implementation Phase of International Mussel Watch, (ng/gdw)

	Lab No.						GERG	MEL
	1	2	3	4	5	6	mean	mean
Extraction	ASTM/UNEP	IAEA	—	Soxhlet, Hexane	—	Soxhlet, Hexane		
Cleanup	ASTM/UNEP	IAEA	—	Florosil	—	Alumina		
%Recovery	70-110%	—	70-85%	—	75-99%	25-80%	91-94%	—
mg/g Lipid	—	63.3	—	—	40.3	48.7	23.6	—
2,4' DDE	—	16.8	12.0	—	12.5	26.0	2.55	0.52
2,4' DDD	31.4	—	37.6	20.7	26.0	16.9	2.22	6.23
2,4' DDT	—	—	7.09	—	23.5	7.40	4.09	0.02
α Chlordane	—	—	—	17.4	2.50	12.2	20.0	21.5
Dieldrin	1.70	—	—	—	24.9	4.30	8.72	2.85
Endosulfan	—	—	10.4	12.8	—	—	—	—
Lindane	—	27.1	7.92	—	35.8	3.50	0.53	0.70
Aldrin	—	1.29	14.5	—	—	N.D.	N.D.	N.D.
PCBs	Congener	Arochlor 1254	—	Arochlor 1254	Arochlor 1254	Congener		

* not corrected for Water or Recovery

this Appendix. These national data and the results of analyses of IMW samples by Host-Country scientists are not discussed here. This issue can be pursued in greater detail by a regional subgroup of the International Mussel Watch Committee.

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Appendix D

Summary of Available Production and Use Data

Since World War II, pesticides have been manufactured in and imported into Latin America countries for agricultural and public health uses. Even though most chlorinated pesticides are currently banned, there are more than 300 active ingredients in 2,000 formulations of non-chlorinated pesticides being produced in Brazil alone (Lara, 1992). The use of pesticides, even when applied correctly, has caused ecological and public health problems such as increased pest resistance, high residue levels in food, applicator toxicity and unintended damage to non-target organisms. Much of the knowledge about pesticide cycling in the coastal environment has been produced in temperate regions of the world and specifics of chemical cycling in the tropical environment , including pesticide longevity and biological effects, remains poorly understood.

In order to understand the environmental cycling of chlorinated hydrocarbon contaminants, it is necessary to determine quantities of each material used and when, where and how fast that material was injected into the coastal ecosystem. Routes of loading, rates of loading and the chemical reactions to which each contaminant is subjected must be known before environmental scientists can begin to unravel the complex lethal and sublethal effects these chemicals may cause in various ecosystem components and at multiple levels of biological organization (e.g., cellular, organ, individual, population, community or ecosystem).

For a variety of industrial, economic and political reasons, data on production and use of toxic chemicals is difficult to obtain. A thorough investigation of production and use of chlorinated biocides in Latin America would require a substantial effort and in recognition of this difficulty (and limitations of funds), acquisition of production and use data could not be diligently pursued as a part of this project. All participants do, however, understand the importence of such information and have made an effort to acquire reports where they were available. Host-Country scientists searched for production and use data as a part of their support of the Project and reports they located are included in the reference section of this Appendix. While a significant effort was made, this collection of citations should not be considered comprehensive or complete. Cited reports do contain extensive data which can yield a greater understanding of production and use in the Latin America region and could be synthesized as one step toward an improved understanding of environmental cycling. This synthesis is also a topic for more thorough investigation by scientists in the region, perhaps guided by a regional subgroup of the International Mussel Watch Committee.

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Appendix E

Report of Field Scientist: field sampling program

General

This Appendix provides a detailed description of the field sampling and logistics in Central and South America, including Mexico and the Caribbean area, for the Initial Implementation Phase of the International Mussel Watch Program.

Sampling activities for this phase of International Mussel Watch were based primarily at the University of Costa Rica in San Jose. The sampling missions were planned and carried out in close collaboration with the Executive Officer in Woods Hole and local scientists in Host Countries. A total of seven sampling missions covered 76 locations in 18 countries. Six of these mission were operated out of Costa Rica. The seventh sampling mission was operated out of College Station, Texas.

The International Mussel Watch manual (IMW, 1992) and the recently published NOAA methods manual (NOAA, 1993) contain detailed guidelines for field sampling and should be used by anyone who is planning to initiate a field sampling program.

Geographical Distribution of Bivalves

Distribution patterns of bivalve assemblage are dependent on water depth, substrate type, turbidity, salinity, wave energy and latitude. Because of the large area of this study, latitude played a very important role in the species of bivalves found at the different sampling locations. As a result, a variety of different bivalves were collected (Table E1).

Field Logistics

Collection of bivalves was conducted by the Field Scientific Officer with the assistance of Host Country scientists (Appendix F). Previous contacts between the Executive Officer, at Woods Hole, and/or the Field Scientific Officer, in Costa Rica, with scientists in host countries helped to identify the possible sampling sites within each country.

Local laboratories served as the base for the sampling operations in the different countries and the field collection were operated out of these laboratories. Access to the sampling locations was, in general, by car. In instances where a boat was required to access to the sampling sites, the boat was either provided by the local institution or it was rented from local fishermen. Bivalve samples were collected by hand or by divers and processed within 24 hours on-site at the local laboratories. Samples were kept frozen in pre-cleaned screw-cap jars and transported in coolers by the Field Scientific Officer from laboratory to laboratory, from country to country or to the final

TABLE E1. Bivalve species sampled for the International Mussel Watch Program

Oysters	Mussels	Others
Crassostrea rizhophora	*Mytilus edulis*	*Anadara tuberculosa*
Crassostrea virginica	*Mytilus edulis chilensis*	*Anadara similis*
Isognomon alatus	*Mytilus platensis*	*Anadara grandis*
Crassostrea corteziensis	*Perumytilus purpuratus*	*Anomalocardia brasiliana*
Crassostrea columbiensis	*Mytela guayanensis*	*Corbicula fluminea*
	Mytella falcata	*Protothaca grata*
	Perna perna	
	Aulacomya ater	
	Bracchiodontes rodrigezii	

destination in Costa Rica and then College Station, Texas. samples were stored frozen in Texas until analysis.

In a few countries or locations where there were no local contacts, the access to the pre-selected sampling locations was either by rented car or public transportation and sampling was completed with the assistance of local fishermen. In these cases, the samples were processed on combusted aluminum foil in the hotel and kept in the freezer of the hotel restaurant or a local store with freezer until ready to move them to a new sampling location or transported back to Costa Rica.

During this initial phase, no geographic location data was recorded. In the future, the IMW Field Scientist should be supplied with hand-held GPS instrumentation to systematically record the location of each site.

Sample Collection

Bivalves were collected by hand, with tongs or using a small hand-held dredge. Inter tidal and shallow subtidal sites were collected by hand. Because of the large area covered in this study, bivalves were found to be attached to rocks, attached to the roots of mangroves, buried in the mud or in the sand or simply lying on hard to medium-soft bottom. At deeper subtidal sites, bivalves were collected with the help of local divers. In a few cases were the direct access to the sampling area was not possible, the sample was obtained from commercial oyster fishermen. Clumps of bivalves were separated in individual organisms before cleaning. Bivalves were separated from attached debris and/or mud and washed "in situ" before shucking them in the laboratory. In locations where more than one species of bivalves were present, i.e. none of the bivalves was obviously dominant, samples of the different species were collected. This allowed not only for a species inter comparison at a given site but also to compare sites where only one of the species is present.

Sample Processing

In general, samples were processed the same day they were collected. As samples were collected, they were cleaned, labeled according to site, station and replicate and kept in ice chests until ready to be processed in the laboratory later in the day. An effort was made to collect pooled organisms within the same size range. This was done with the intention to assure that pooled organisms were of similar age. Since the decision was to collect sufficient sample from each site, e.g. 200 to 300 grams of wet tissue per station (up to 900 grams of wet tissue per site), to allow for re-analyses of a sample if necessary, the number of pooled organisms in each sample varied with organism size. In all but one site, the number of pooled organisms per sample was 10 or more individuals per sample. In all cases, shells from samples collected were retained for species confirmation and further analysis where appropriate.

In the laboratory, the bivalves were shucked on combusted aluminum foil using a clean oyster knife, the tissue combined into a pre-cleaned jar with a Teflon-lined screw-cap seal and kept frozen in the host countries laboratories. Each jar is a unique replicate sample and is individually labeled with the location descriptor, date and organism species. In those sampling locations where no local contacts were made, the sample processing was done at the hotel on pre-combusted aluminum foil. Sample tissue was placed in pre-cleaned jars with a Teflon-lined seal and kept in the freezer of the hotel restaurant or a local store with a freezer until ready to be moved to a new sampling site or transported back to Costa Rica. Eventually all samples were shipped to College Station, Texas which is the temporary central sample archive for IMW.

Sampling Criteria

Tentative sample sites were initially pre-selected to give a good coverage of the Atlantic and Pacific coasts of Central and South America, including Mexico and the Caribbean. Collection of duplicate samples from two or three seperate stations within each sampling site, was attempted in order to characterize the site. In general, stations were located a few hundred meters apart and a single embayment or length of coastline (i.e., "site") would contain one or more "stations" at which replicate tissue samples were collected. When more than one bivalve species were present at a single station without an obvious dominance of any of them, duplicate samples of each species were also collected.

The general sampling criteria included the sampling of mature organisms from areas beyond the zone of initial dilution of wastes or suspected point-source discharge of contaminants. In most cases, sampling was limited to natural substrates, e.g. rocks, mangroves or mud, to avoid any potential contamination. In a few instances, however, bivalves were only found attached to artificial structures, e.g. pilings, bridges, etc. In these cases, samples were collected and the type of artificial structured recorded in the sampling logbook. Final decision regarding the sampling site at the pre-selected sites was based on the suitability for the site to allow for this and follow-up samplings without affecting the resource.

Sampling Problems

Although an attempt was made to obtain samples from every pre-selected site, this was not always possible. Different factors worked against this objective. Following is a brief description of some of the sampling problems, in no particular order, encountered during this field program.

Pre-selection of sampling areas

Bivalves could not be found at some of the pre-selected sites. This was, for example, the case of Cancún in Mexico and in Limón/Cahuita, Costa Rica. Since there were no alternate location which supported bivalve in the area, these sites had to be deleted. Because of the unsafe conditions (for the sampler) in Guatemala at the time of sampling, no alternative site was attempted to replace pre-selected Puerto Barrios. In Belize, the bivalve population was very small and although a sample was collected in front of Belize city, a follow-up sampling in this area might not be possible.

In other sites, the bivalves were located only in areas of difficult access or the collection required the use of equipment only available through local fishermen. Since the Field Scientific Officer did not have the resources to hire a fishing boat for the sampling and/or to compensate for a full day of work, the bivalves were obtained directly from local fishermen as they returned from their daily activities. Complete sampling details, including location and description of the area was recorded in the sampling log book by the Field Scientist.

It is essential that the person charged with field sampling responsibilities have extensive experience and be given latitude to make final site selection decisions in the field in consultation with local scientists.

Site selection within a sampling area

Although the general sampling area was pre-selected by the IMW Committee, most of the actual sampling stations within these sites have been suggested by local scientists. In most cases, the local scientists had previous working experience in the proposed sites and it was relatively easy to find good sampling stations. In a few cases, even the local information, concerning the presence of bivalves in a given location was poor. In these cases, the location of bivalves and/or a representative sampling site for the general area was more difficult and more time consuming than it should have been. In a few instances, it was not possible to find the bivalves and the sampling at the site had to be canceled.

Lack of local contacts

In many sampling sites in different countries (e.g. Río Gallegos, Bocas del Toro, Cumana, Lagoa Mundaú/Maceió, Fortaleza, Sao Luis, Belem/Bragança, Vitoria, Puerto Montt, Punta Arenas, Valparaiso, La Serena, Arica, Antofagasta, Puerto La Unión, Puerto La Libertad, Belize City, La Ceiba, San Lorenzo, Puerto Barrios, Cancún, Laguna de Términos, Laguna del Ostión, Bahía La Ventosa, Puerto Escondido, Puerto Madero, Tampico, Laguna Madre, and San Carlos) it was not possible to contact local scientists. These sampling locations represent approximately 40% of the pre-selected sites for this program. Although samples were collected from all but two of these sites without the assistance of local scientists (e.g. Puerto Barrios and Cancún), their presence would have undoubtedly made the sampling easier and safer. Collected samples were processed at the local hotel and kept in the freezer of the restaurant or at local stores with a freezer until ready to be moved to a new sampling site or transported back to Costa Rica. If previously arranged contacts with local scientists cannot be made, the Field Scientist should travel with a companion for assistance and personal security in remote areas.

Variety of species

Because of the large area covered by this study, it was not possible to sample the same species of bivalves at every location. As a result, a number of different species had to be sampled. In those locations where no species was obviously the dominant one, a sample of every species encountered in the site was collected. This will allow for a inter-comparison among the different bivalves and will provide valuable information when comparing different locations where only one of the species is present.

Sampling Summary

Six sampling missions operated out of Costa Rica and one sampling mission operated out of College Station, Texas. Following is a brief description of the sampling missions (sampling date in parenthesis), location characteristics and possible sources of contaminants as observed by the Field Scientist. The order of the following descriptions is chronological, following the actual schedule of the sampler. Samples collected were numbered sequentially with a unique 4-digit identification code as they were collected. A summary of the IMW sample collection is found in Appendix A.

In general, duplicate samples were collected from 3 different stations within each site. Distances between stations varied from 500 to 1000 meters. Total wet weight tissue per station was between 200 and 300 grams in 2 replicate samples and total wet weight of tissue per site is approximately 600 to 900 grams. When conditions did not allow for the sampling of 3 different stations within each site, duplicate samples from only 1 or 2 stations were collected. In instances where more than one species was present, all of them were sampled in order to allow for species inter comparisons that might assist in comparing areas where only one of these species is present. Photographs of the locations/stations were taken to document the area for further sampling efforts. Shell samples from each location were kept for a later confirmation/identification of the species. Frozen samples were transferred to San José, Costa Rica.

1st IMW Sampling Mission: Argentina and Uruguay

Bivalve samples from 9 pre-selected sites in Argentina and 2 in Uruguay were collected between November 13 and December 5, 1991.

ARGENTINA

Hudson (11/17/91). Hudson is located about 45 km to the southeast of Buenos Aires city. Approximate travel time was 1:15 h. At this site 3 duplicate samples (*Corbicula fluminea*) were collected.

Contamination:: Industrial effluents

Atalaya (11/17/91): Atalaya is located about 60 km to the southeast of Hudson; approximate travel time was 1:30 h. Three duplicate samples (*Corbicula fluminea*) were collected at this location

Contamination:: Industrial effluents

Punta Piedras/Punta Indios (11/19/91). Sampling in these locations, less than 20 km apart, was attempted because they are located in the fresh water-seawater mixing zone (Río de la Plata - Atlantic Ocean). The most external site, Punta Piedras, is located 175 km (southeast) from Buenos Aires. Sample collection at any of these sites was not possible because strong winds kept the water level to high for sampling. Local sources, however, indicated that bivalves were not present in the area because of very soft substrate. On the way back to Buenos Aires, alternative sites were searched but the high tide aborted a sampling attempt.

URUGUAY

Punta del Este (11/21/91). Punta del Este is located 120 km to the east of Montevideo. At this site, 3 stations were sampled (*Mytilus platensis*); two of the stations are located on the coast about 500 meters apart. The third station is located near Gorriti Island. This last sample was obtained from local fishermen working in the area.

Contamination:: Domestic effluents. Recreational boating.

Santa Lucía (11/25/91). Sampling at this site was originally attempted on 11/21/91, but problems with the boat aborted the mission. This site was later sampled by Dr. Jorge Altamirano from the Instituto Nacional de Pesca (INEPA) who helped with the sampling and processing of the mussels collected in Punta del Este. Santa Lucía samples (*Corbicula fluminea*) were collected in duplicate from 1 station and sent frozen (same day delivery) to the Servicio de Hidrografía Naval (SHN), Buenos Aires.

Contamination:: Industrial effluents

ARGENTINA (cont.)

Mar del Plata (11/25/91). Bivalves found along the shore were to small to be sampled. Duplicate samples (*Mytilus platensis*) were obtained from 3 stations located about 3000 meters offshore. The 3 offshore stations are located parallel to the coast in front of the city of Mar del Plata. The samples were provided by Dr. J. Delbusto from SENASA who, at the sampling time, was involved in red tide studies and was working with local fishermen.

Contamination:: Domestic and industrial effluents. Navy port.

Pehuen-co (11/26/91). This site and next, Arroyo Parejas, completed the sampling in the Blanca Bay area. Bivalves in the upper portion of the Blanca Bay were depleted possibly because of a large number of industries along the coast. Pehuen-co is located just outside Blanca Bay and about

100 km from the city of Bahía Blanca. Mussels (*Brachiodontes rodrigezii*) were small. Only one duplicate sample was collected. Access to the site is by car from Bahía Blanca.
Contamination:: No sources of contamination were observed.
Arroyo Parejas (11/26/91). This is the second site sampled in the Blanca Bay area. Arroyo Parejas is located midway into the bay near Puerto Belgrano, a navy base. Distances between Arroyo Parejas and Bahía Blanca is about 35 km and between Arroyo Parejas and Pehuen-co is about 70 km. Because of the small size of the mussels (*Brachiodontes rodrigezii*), only one duplicate sample was collected by hand. Access to the site is by car from Bahía Blanca.
Contamination:: Navy base.
Camarones Bay (11/27/91). Camarones is located 320 km to the south of Puerto Madryn. Duplicate samples (*Aulacomya ater*) were collected from 3 stations. A sample of a co-existing mussel (*Mytilus platensis*) was also collected at one station to compare contaminant concentrations. Access to the site is by car from Puerto Madryn.
Contamination:: No sources of contamination were observed.
Rawson (11/27/91). This site is located about 80 km to the south of Puerto Madryn and on the margins of the Chubut river. Samples (*Mytilus platensis*) were collected from 3 stations. Because of the small size of the mussels, only single samples at each station were collected.
Contamination:: Chubut river.
Ushuaia (11/28/91). Three duplicate samples (*Mytilus edulis chilensis*) were collected from 3 stations located in front of the city of Ushuaia. This sampling site is located within city limits. Access to the area is by car.
Contamination:: Domestic and industrial effluents. Navy port.
Rio Gallegos (11/29/91). Samples were collected from 3 stations in Punta Loyola, located about 40 km from Río Gallegos. Access to the site is by car.
Contamination:: No sources of contamination were observed.

2nd IMW Sampling Mission: Panama

Bivalve samples from Panama were collected between December 17 and December 19, 1991 at 3 pre-selected locations. A fourth site, Bocas del Toro, was left to be accessed from Costa Rica. As with the previous sampling mission, duplicate samples were collected from 1 to 3 stations within each site; total wet weight tissue per station was between 200 to 300 grams and photographs of the area were taken to document the area for further sampling efforts. Shell samples from each station were kept for a later confirmation/identification of the species. Frozen samples were transferred to San José, Costa Rica.

PANAMA

Portobelo (12/18/91). Portobelo is located about 110 km from Panama city on the Caribbean Sea. A "cayuco" (a one piece canoe made out of a tree trunk) was rented from native fishermen to search for bivalves. Bivalves were not very abundant in this area. One duplicate sample (*Isognomon alatus*) was collected from the roots of mangroves. Access to the site is by car from Panama city and then by boat.

Contamination:: No sources of contamination were observed.

Punta Chame area (12/19/91). Two different sites were sampled within this general area. **Playa Bique,** located about 30 km to the west of Panama city, on the Pacific coast, was the first site to be sampled. Duplicate samples (*Mytilus edulis*) from 2 stations were collected by local people. Sampling stations are located about 500 meters apart. The second site, **Punta Chame,** is located 90 km to the west of Playa Bique. Samples (*Anadara tuberculosa*) were obtained from local fishermen who had collected this bivalves a few hours earlier from within the roots of mangroves.

Contamination:: No sources of contamination were observed in either location.

3rd IMW Sampling Mission: Nicaragua, Costa Rica and Panama

Bivalve samples from 7 sites in Nicaragua and Costa Rica were collected between January 7 and January 18, 1992. No samples could be obtained from pre-selected sites at Bluefields (Nicaragua) or Limón (Costa Rica). Samples from Bocas del Toro, Panama, were collected between January 21 and January 22, 1992 to complete the sampling in that country. As in the previous sampling missions duplicate sampling at more than one station within a given site was routinely attempted. Wet weight tissue per station was the same; photographs of the were taken for documentation of the area; shell samples from each location were kept ; frozen samples were transferred to San José, Costa Rica.

NICARAGUA

Isla de Aserradores (01/11/92). Isla de Aserradores is located about 20 km to the north of Puerto Corinto, a pre-selected site, and close to the border between Nicaragua and Honduras on the Pacific coast. Duplicate samples (*Anadara tuberculosa*) were collected from within the roots of mangroves at 2 stations with the help of local people. Access to the site is by car from Managua (180 km).

Contamination:: Cotton, banana and sugar cane fields.

Ostional (01/11/91). Ostional is located on the Pacific coast near the border between Nicaragua and Costa Rica, about 350 km from Isla de Aserradores and 170 km to the south of Managua. A duplicate sample was obtained from local fishermen.

Contamination:: No sources of contaminants were observed.

Bluefields. This location was pre-selected as a sampling site on the Caribbean coast. The sampling trip to Bluefields was not possible because of flight cancellations to and from Bluefields-Puerto Cabezas and Managua. This site was left for later sampling.

COSTA RICA

Gulf of Nicoya Area (01/15/92). Three sites were sampled in the Gulf of Nicoya, located on the Pacific coast of Costa Rica about 140 km from San José. The first site, **Estero Jicaral**, is located on the west coast of the Gulf of Nicoya, opposite Puerto Morales. Duplicate samples (*Anadara tuberculosa* and *Prototaca sp.*) were collected by hand from within the roots of mangroves. The second site, **Isla Paloma**, is a very small island located in the upper portion of the Gulf of Nicoya. Duplicate samples (*Anadara grandis*) were collected from a single station. The third site, **Estero Cocoroca**, is located on the east costa of the Gulf of Nicoya a few kilometers south of Puerto Morales and opposite Estero Jicaral. Duplicate samples (*Anadara tuberculosa* and *Anadara similis*) were collected from one station within the roots of the mangroves. Distances between Estero Jicaral and Isla Paloma, between Isla Paloma and Estero Cocoroca and between Estero Cocoroca and Estero Jicaral are about 20, 30 and 25 km, respectively. Access to the sampling sites is by car from San José and by boat from Puerto Morales.

Contamination:: Except for the area close to the city of Puntarenas (not sampled), the Gulf of Nicoya seems to be a pristine area

Golfo Dulce Area (01/17/92-01/18/91). Golfo Dulce is located about 350 km from San Jose on the Pacific coast and near the border between Costa Rica and Panama. Two sites were sampled at this location. The first one, **Golfito**, is within the city limits of the city of Golfito. Duplicate samples (*Anadara tuberculosa, Anadara similis* and *Prototaca sp.*) were collected from two stations The second site, **Punta Zancudo**, is located about 50 km from Golfito. The sampling site is located near the mouths of the Coto and Sabalo rivers. Duplicate samples (*Anadara tuberculosa*) were collected from one station. Access to the sites is by car from San José.

Contamination:: Golfito-Domestic effluents. Punta Zancudo-No sources of contamination were observed.

PANAMA (cont.)

Puerto Almirante (01/22/91). The sampling location is located in the Bocas del Toro area, close to the border between Panama and Costa Rica on the Caribbean coast. The site is located about 1000 meters from the port of Puerto Almirante, toward open water. Duplicate samples were collected by hand by divers from two stations about 300-400 meters apart. Water Depth was between 1.5 to 2.5 meters. Access to the site is by boat.

Contamination:: Port activities (most of the banana production from this area is shipped from Puerto Almirante). Domestic effluents are discharge from houses directly into the coastal waters. Cholera.

4th IMW Sampling Mission: Colombia, Venezuela, Trinidad and Aruba

Bivalve samples from 9 sites in Colombia, Venezuela, Trinidad and Aruba were collected between February 9 and February 26, 1992. In Colombia, samples were collected in 3 of 4 pre-selected sites (Cartagena, Santa Marta and Tumaco). No samples were collected from Buenaventura. In Venezuela, samples were collected from 3 sites: Paparo, Morrocoy National Park and Cumana. No samples were collected in Maracaibo (depleted population) or from the Curiapo site located on the margins of the Orinoco river delta (no local contact). Sampling in the Trinidad and Tobago area were carried out near Port of Spain and at the southeast extreme of Trinidad. The last sampling site is facing the delta of the Orinoco river and replaces the Curiapo site in Venezuela. Samples in Aruba were collected in the vicinity of the port. Sampling details are similar to the previous missions.

On February 18, personnel of CICA at the University of Costa Rica, collected samples in Tortugueros, located on the Caribbean coast of Costa Rica. This site replaced Limón.

COLOMBIA

Cartagena Bay (02/11/92). Known oyster beds have been mostly depleted in Cartagena Bay. Duplicate samples (*Crassostrea rizhophorae*) were collected from two sites in Cartagena Bay. One, **Cienaga de los Vazquez**, is a fairly enclosed area located outside Cartagena Bay, near Boca Chica.. A second site (**Isla Tierra Bomba**) is located inside Cartagena Bay. Access to the sites is by boat.

Contamination:: No sources of contamination were observed in Cienaga de los Vazquez. Domestic and industrial effluents, port and marine transit might be significant sources of contamination to the second site.

Santa Marta (02/12/92). Cienaga is located about 195 km from Cartagena. Cienaga Grande is located about 10 km from Cienaga. Three stations were sampled. Depending on the station, oysters (*Crassostrea rizhophorae*) were lying on hard bottom, attached to the roots of mangroves or attached to rocks on the coast. Access to the sampling sites was by boat.

Contamination:: No sources of contamination were observed other than small villages on the coast. Water circulation is very restricted.

Tumaco (02/14/92). Duplicate samples (*Anadara tuberculosa* and *Anadara similis*) were collected from three stations in the Tumaco area with the help of local people. Access to the sampling sites was by boat.

Contamination:: Domestic effluents.

VENEZUELA

Paparo (02/17/92). Paparo is located about 160 km from Caracas. Samples were collected from 3 stations located to the east of the Tuy river. The first station is located just to the east of the mouth of the river. The second and third stations are about 500 and 1000 meters to the east from station 1. No bivalves were found to the west of the mouth of the Tuy river. Access to the site is by car from Caracas.

Contamination:: The Tuy river brings industrial and domestic wastes from Caracas and several smaller cities.

Morrocoy (02/19/92). Morrocoy National Park is located about 280 km from Caracas. Duplicate samples (*Isognomon alatus*) were collected from 3 stations. Oysters were attached to the roots of mangroves. Access to the sampling stations is by boat.

Contamination:: Morrocoy National Park seems to be a pristine area.

Cumana (02/25/92). Cumana is located 450 km from Caracas. Duplicate samples were collected in front of the city by a local diver. Samples were shucked "in situ" and kept on ice during the trip back to Caracas.

Contamination:: No sources of contamination were observed.

TRINIDAD

Caroni Swamp (02/20/92). Caroni Swamp is located about 7 km from Port of Spain. Duplicate samples (*Mytela guayanensis*) were collected from the mud within the roots of mangroves along one of the many channels opened through the mangroves. Access to the site is by boat.

Contamination:: The swamp receives the water drained from a large agricultural area around Port of Spain.

Southern Range (02/21/92). This site is located on the southeast extreme of Trinidad and facing the delta of the Orinoco river. Duplicate samples were collected from 3 stations covering over 1000 meters along the beach. Access to the site is by car from Port of Spain (200 km).

Contamination:: Oil platforms.

ARUBA

Commander's Bay (02/23/92). Commander's Bay is located about 15 km to the south of the capital city in the vicinity of the main port in Aruba. Duplicate samples were collected by a local diver from 3 station located about 250 meters apart. Water depth varied from 1.5 to 2.5 meters. Access to the site is by car.

Contamination:: The site is located by the main port in Aruba. Petroleum tanks.

5th IMW Sampling Mission: Brazil, Chile, Peru and Ecuador

Eighty nine samples from 12 sites in Brazil, 7 sites in Chile, 2 sites in Peru and 2 sites in Ecuador were collected between March 15 and May 2, 1992 in a single sampling mission. With a few exceptions, samples were collected at the pre-selected sites. In Brazil, for example, Bragança and Maceió replaced Belem and Aracaju, respectively. The pre-selected Isla Caviana was deleted while Sao Luis and Guanabara Bay were added to the sampling list. In Chile, 2 sites (Puerto Montt and Concepción) replaced Valdivia. Arica was added to the sampling list to give a better coverage of the Chilean-Peruvian coast between Antofagasta (Chile) and Paracas-Pisco (Peru). In Ecuador, Bahía de Caraquez replaced Esmeraldas.

As in the previous missions, replicate sampling was attempted at more than one station, usually a few hundreds meters apart, per site. Total wet weight tissue per station was between 200 to 300 grams. Photographs of the locations /stations were taken to document the area for further sampling efforts. Shell samples from each location were kept for a later confirmation/identification of the species. Frozen samples were transferred to San José, Costa Rica.

BRAZIL

Santos (03/16/92). Santos is a coastal port city located about 90 km from São Paulo. Duplicate samples (*Perna perna*) were collected from 3 different stations along the main ship channel. Access to the site is by car from Sao Paulo and by boat to the sampling stations.

Contamination:: A large number of industries (chemical industries, oil refineries, etc.) discharge their wastes either directly into the bay or into the Cubatao river. This river discharges in the upper part of the Bay of Santos.

Salvador (03/18/92). The sampling site is located about 95 km from Salvador. Samples of 3 different bivalves were collected at one station during low tide. Mussels (*Mytela guayanensis*) were collected from within the mangroves, oysters (*Crassostrea rizhophorae*) were collected from nearby underwater constructions and *Anomalocardia brasiliana* were found in the sandy inter tidal area. Access to the site is by car from Salvador.

Contamination:: Effluents from paper mills are discharged into this area. Domestic effluents. Several small creeks.

Recife (03/20/92). Oyster and mussel samples were collected from 3 stations in Pina Bay. Oysters (*Crassostrea rizhophorae*) were collected from inter tidal populations during low tide. Mussels (*Mytella falcata*) were collected from beds on the mud (0.5-1.0 water depth during low tide). The site is located within city limits.

Contamination:: Several rivers (Jordao, Tejipio and Jiquia) run through the city of Recife and discharge into the Pina river before reaching the Pina Bay. Industrial and domestic effluents. Port activities. Cholera

Lagoa Mundaú/Maceió (03/21/92). Maceió is located about 200 km south of Recife. This area was sampled instead of a pre-selected site near Aracajú because of its importance as a mussel-producing area for human consumption in Brazil. Mussel (*Mytella falcata*) samples were collected by hand from beds on the soft bottom by local fishermen working in the lagoon.

Contamination:: Limited water exchange with the open sea. Domestic effluents directly discharged in channels empty into the lagoon. Cholera.

Fortaleza (03/23/92). Two different sites were sampled in Fortaleza. The first location is a fairly small rocky formation about 400-500 meters long in front of the city. Two duplicate oyster samples (*Crassostrea rizhophorae*) were collected at this site from stations about 300 meters apart. A third sample (*Mytella guayanensis*) was obtained from a second site located near the mouth of the Coto River on the opposite side of the city. Mussels were collected from within the roots of mangroves. Access to both sites is by car.

Contamination:: Industrial and domestic effluents, port activities and fisheries were observed at the first site. No sources of contamination were observed at the second location other than the Coto River which runs through part of the city of Fortaleza.

Sao Luis (03/25/92). Duplicate mussel samples (*Mytella guayanensis*) were collected from 2 stations, during low tide, at the Lagoa da Jensen located to the east of San Marcos Bay. Mussels were collected from the mud within the mangroves. The site is located within city limits and access is by foot.

Contamination:: Domestic effluents. Cholera.

Belem/Bragança (03/26/92). Bivalves could not be found near Belem. The nearest mussel producing area was found near Bragança, located about 100 km to the north of Belem. Mussels were obtained from fishermen working in the area.

Contamination:: Amazon river. Cholera.

Vitoria (03/29/92). Duplicate mussel samples (*Perna perna*) were collected from 2 stations in Vitoria Bay, located within city limits. Access to the site is by foot, or by boat.

Contamination:: Port activities. Oil refineries. Industrial and domestic effluents. At the time of sampling, swimming in the area was restricted because of contaminated waters.

Cabo Frio (03/30/92). Duplicate mussel samples (*Perna perna*) were collected from 3 different stations during low tide. Access to the site is by boat.

Contamination:: This is fairly isolated area. Some port activity. Small fisheries. Water circulation might bring wastes from oil producing platforms working in coastal waters.

Guanabara Bay/Niteroi (03/31/92). This site was sampled on the way to the Rio de Janeiro Airport while transferring from Cabo Frio to Pontal do Sul. Duplicate mussel samples were collected from a rocky formation in front of the city of Niteroi. Mussels were kept in a cooler and shucked in Pontal do Sul about 10 h. later. Mussels were tightly closed at the time of processing.

Contamination:: Industrial and domestic effluents. Petroleum-related activities. Port. This area is considered to be one of the most polluted areas in Brazil.

Paranagua (04/01/92). Duplicate mussel samples were collected from 2 stations in Laranjeiras Bay. Samples were collected by hand from mussels bed located in the inner portion of the bay (0.5-1.0 water depth). This site is located about 1 h. from Pontal do Sul and the city of Paranagua. Access to the sampling stations is by boat.

Contamination:: This seems to be a fairly pristine area of the Paranagua/Laranjeiras Bay system.

Lagoa dos Patos (04/02/92). Duplicate mussel samples (*Perna perna*) were collected from 2 stations located about 500 meters from the mouth of the lagoon. Stations face the open ocean, and were collected by hand. Access is by boat.
Contamination:: Different industries (chemical, oil-related, fertilizer, etc.) discharge wastes into the lagoon. The lagoon also receives, directly or indirectly through smaller interconnected lagoons, surface waters drained from a large upland area with extensive agriculture.

CHILE

Puerto Montt (04/09/92). Puerto Montt, together with Concepción, replaced the Valdivia site. Samples were obtained from local fishermen/divers. Duplicate samples (*Aulacomya ater*) were obtained from 2 areas in this region: Guar Island and from near the mouth of the Relon Cavi river. Duplicate mussel samples were obtained from the station near the mouth of the Relon Cavi river. Access to the sampling sites is by boat.
Contamination:: No sources of contamination were observed in the area.

Punta Arenas (04/10/92). The sampling site is located in front of the city of Punta Arenas about 1000 meters from the main port. Duplicate mussel samples were collected from 2 stations located about 300 meters apart. At one station, an extra sample of *Aulacomya ater* was collected. Access to the site is by car.
Contamination:: Punta Arenas Port. Domestic effluents.

Valparaiso (04/12/92). One duplicate sample (*Perumytilus purpuratus*) was collected during low tide at a site located about 100 meters from the port of Valparaiso. Access to the area is by car.
Contamination:: Port Activities. Industrial and domestic effluents.

La Serena (04/13/92). Bivalves were depleted in this area. Duplicate mussel samples (*Aulacomya ater*) were obtained from local fishermen/divers who had collected the organisms near Quebrada Grande about 4 h earlier. Quebrada Grande is about 20 km to the north of La Serena. Access to the area is only by boat.
Contamination:: Quebrada Grande seems to be a pristine area.

Arica (04/16/92). At this site, bivalves (*Perumytilus purpuratus*) were collected from 3 stations during low tide. Stations were located about 300 meters apart from each other. Sampling stations were located to the south of the main port of Arica. The sampling site is within the city limits and access is by car.
Contamination:: Port activities. Fisheries. Industrial and domestic effluents.

Antofagasta (04/18/92). As in La Serena, bivalves were not found near the city of Antofagasta, Samples (*Aulacomya ater*) were obtained from local fishermen/divers who collected the organisms in Caleta Coloso a few hours earlier. Caleta Coloso is located about 18 km to the south of Antofagasta. Access to the sampling site is only by boat.
Contamination:: Caleta Coloso seems to be a pristine area.

Concepción (04/20/92). The sampling site was located between the Bio-Bio river and San Vicente Bay. Duplicate samples (*Perumytilus purpuratus*) were collected from 3 different stations within this area. Station #1 was located at the mouth of the Bio-Bio river. Stations #2 and #3 were located about 500 and 1000 meters from station #1, respectively. Access to the site is by car.
Contamination:: Domestic and industrial effluents from Concepción are discharged through the river. Paper mills are located along the river. Chemical Industries. Shipping/receiving of oil.

PERU

Callao (04/24/92). Two samples were collected by hand from piers located in Callao near La Punta. Mussels were small and reduced in number.
Contamination:: Domestic and industrial effluents. Navy and commercial ports. Cholera.

Paracas (04/25/92). Two different species of mussels were collected from 2 stations in Paracas' Peninsula near Pisco. The stations, about 500 meters apart, are located in front of the El Candelabro formation.
Contamination:: No sources of contamination were observed. Cholera.

ECUADOR

Guayaquil (04/29/92). Duplicate samples (*Mytela guayanensis*) were collected from the mangroves at 2 stations located in Estero Salado. Stations are located about 800 meters apart. Samples were collected by hand during low tide. Access to the site is by car.
Contamination:: Domestic and industrial effluents. Technical DDT is sold in the street.

Chone River (Bahía de Caraquez) (04/30/92). This area, which replaced Esmeralda at the suggestion of local scientists, is an important shrimp production region. Duplicate (*Prototaca sp.*) and a single (*Anadara tuberculosa*) samples were collected at 1 station in this area.
Contamination:: No sources of contamination were observed in the area.

6th IMW Sampling Mission: El Salvador, Belize, Honduras and Guatemala

Sixteen bivalve samples from 2 sites in El Salvador, 1 site in Belize and 2 sites in Honduras were collected between June 28 and July 11, 1992. Samples were, in general, collected at the pre-selected sites. Samples in El Salvador were collected near Puerto La Union on the Gulf of Fonseca and Puerto La Libertad on the Pacific coast. La Libertad replaced a requested second sampling site in the Gulf of Fonseca area from El Salvador. A second sampling site on the Gulf of Fonseca (San Lorenzo) was accessed from Honduras. In that country, La Ceiba replaced Puerto Trujillo on the Caribbean coast. Direct access to Puerto Trujillo was difficult. In Belize samples were collected in front of Belize City. In Guatemala, no bivalves were found in Puerto Barrios. Because of the lack of a local contact in Guatemala and the very unsafe conditions at the time of sampling, no alternative sampling site was attempted.

Sampling details are similar to the previous missions.

EL SALVADOR

Puerto La Unión (06/29/92). Puerto La Unión is located about 200 km from San Salvador on the Gulf of Fonseca. At this site, duplicate samples (*Anadara tuberculosa*) were collected from 2 stations. Stations 1 and 2 are located about 500 and 100 meters to the north of Hotel "El Pelicano" in Canton Huisquil, respectively. Canton Huisquil is located 3 km to the north of Puerto La Unión. Access to the sampling site is by car/bus from San Salvador. Samples were collected with the help of local people.

Contamination:: This area of El Salvador was, before the internal war, an important cotton-producing area. Presently, most of the cotton fields are lost. Except for a few corn fields, no much agricultural activity is observed in the area. No obvious sources of contamination were observed in Puerto La Unión other than domestic effluents.

Puerto La Libertad (06/30/92). Puerto La Libertad is located on the Pacific coast about 35 km from San Salvador. At this site, duplicate samples were collected from one station with the help of a local diver. The station is located in front of the local cemetery about 500 meters to the west of the main fishing pier. Access to the sampling site is by car/bus from San Salvador.

Contamination:: Domestic effluents. Fishing activities. A small river discharges near the sampling area.

BELIZE

Belize City (07/02/92). Sampling site is located within the city limits. Samples (*Crassostrea rizhophorae*) were collected from the rocks along the shore in front of the Embassy of Mexico. The site is located about 500 meters to the north of the mouth of the Haulover river which runs through the city. Oysters were difficult to find.

Contamination: The most obvious source of contamination is the Haulover river. Domestic effluents. Heavy boating activities was observed in the river, e.g., fishing, transport.

HONDURAS

La Ceiba (07/04/92). La Ceiba replaced Trujillo on the Caribbean coast of Honduras. The sampling site is located about 1 km to the east of the restaurant "El Piloto" near the construction site of the new port of La Ceiba. Duplicate samples were collected from one station.

Contamination:: No sources of contamination were observed in the area. At the time of sampling there was a confrontation between the Standard Fruit Company (SFC), who does most of the fruit processing in (and shipping from) Honduras, and the city of La Ceiba because of reports on the use of banned pesticides (e.g. lindane and DDT) by the SFC in the area. Apparently, laboratories in Tegucigalpa had detected pesticide residues in fruit samples.

San Lorenzo (07/06/92). The second sampling site on the Gulf of Fonseca, San Lorenzo is located 2.5 h. from Tegucigalpa by bus. Samples (*Anadara similis* and *Anadara tuberculosa*) were collected from 2 stations located in an area with mangroves. Access to the sampling site is by boat.

Contamination:: No sources of contamination were observed in the area other than domestic effluents.

GUATEMALA

Puerto Barrios (07/09/92-07/10/92). No bivalves were found at this location. Because of the unsafe situation in Guatemala at the time of sampling, no alternative site was attempted.

7th IMW Sampling Mission: Jamaica, Mexico and Cuba

Sampling missions to Jamaica, Mexico and Cuba were divided into two phases. During the first one, samples were collected from 2 sites in Jamaica. The second sampling mission involved sampling 13 sites in Mexico and 1 in Cuba. At the end of each sampling trip, the frozen samples were transferred directly to College Station, Texas.

A total of 53 bivalve samples were collected between September 7 and October 21, 1992. Samples were, in general, collected at the pre-selected sites. Samples in Jamaica were collected near Bowden and Port Royal. In Mexico, sampling operations were mainly based in Mérida, Tampico, Mazatlán and Ensenada. Samples from Laguna de Términos (Ciudad del Carmen), Laguna del Ostión (Coatzacoalcos), Bahía Ventosa (Salina Cruz), Puerto Escondido and Puerto Madero were collected using Mérida as the base laboratory. Laguna Madre (Matamoros) and Tampico were sampled from Tampico. Mazatlán was used as the base laboratory for the sampling in Mazatlán and Altata-El Pabellón. Ensenada served as the base of operations for the sampling in Punta Banderas (Tijuana), San Felipe and Ensenada. No bivalves were found in the area of Cancún. Sampling at one site on the Pacific coast near Lazaro Cárdenas, Punta Mangrove, has to be canceled because of unsafe weather conditions. The area was reached by a powerful tropical storm and most routes to Lazaro Cardenas were closed.

JAMAICA

Bowden (09/10/92). This site is located about 60 km from Kingston, between Port Morant and Bowden. Replicate samples (*Isognomon alatus*) were collected from the roots of mangroves at 2 stations. Station 1 and 2 are located 200 and 500 meters, respectively toward the center of the small bay in front of Bowden Marina. Access to the sampling site is by car from Kingston and by boat from Bowden marina.

Contamination:: This site can be considered a clean area and is used for commercial oystering. No obvious sources of contaminants other than a limited boating activities were observed.

Port Royal (09/10/92). Port Royal is located about 15-20 km from downtown Kingston. At this site, replicate samples (*Isognomon alatus*) attached to the roots of the mangroves were collected at 2 stations. The stations face Kingston Harbor between the International Airport and Port Royal. Access to the sampling site is by car from Kingston and by boat from Port Royal.

Contamination:: Domestic effluents. Commercial fishing. Airport. Industries. Main navigational access to Kingston.

MEXICO

Cancún (09/16/92). No samples were obtained from this location. Several sites were searched for bivalves along the Nichupte Lagoon coast between Cancún and Punta Nizuc. Conversations with local fishermen indicated that small bivalves might be found near the mouth of the Manati river. No sampling was attempted there.

Laguna de Términos (09/18/92). At this site samples (*Crassostrea virginica*) were obtained from local fishermen returning from their daily oystering activities. The sampling site, near the Boca de Atasta, is located about 45 minutes by boat from Ciudad del Carmen. Oysters are lying on a hard bottom.

Contamination:: Sources of contamination are petroleum-related activities and local fisheries in the lagoon and nearby Gulf coastal areas. There are several important rivers that discharge in the lagoon (e.g., Palizada, Chumpan and Candelaria rivers).

Laguna del Ostión (09/19/92). The sampling site is located in front of La Barrilla, a small village about 15 km from downtown Coatzacoalcos. At this site, 2 replicate samples (*Crassostrea virginica*) were collected from two stations with the help of local residents. Access to the site is by boat.

Contamination:: No sources of contamination were observed in the area.

Bahía la Ventosa (09/20/92). This location has been added to the sampling program. Bahía Ventosa is located on the Pacific coast of the Isthmus of Tehuantepec, near Salina Cruz. Bivalves ("Rock oysters"), attached to rocks at variable depths, were collected from 3 stations by local divers. Sampling stations are located within 500 meters from each other. Access to the sampling site is by boat.

Contamination:: Petroleum -related activities. Navy base.

Puerto Escondido (09/21/92). Puerto Escondido replaced Punta Maldonado on the original sample scheme. "Rock oysters" (*C. corteziensis*) were collected with the help of local divers. Because of bad weather conditions, only one station, located near Zicatela beach in Puerto Escondido, was sampled. The sampling site can be accessed from the coast.

Contamination:: No obvious sources of contamination were observed in the area other than domestic effluents from Puerto Escondido.

Puerto Madero (09/22/92). Replicate samples of "Rock oysters" were collected from 1 station in front of the local light house. This site is located within the limits of Puerto Madero.

Contamination:: Small port. Local fisheries. Banana fields.

Tampico (09/26/92). Samples (*Crassostrea virginica*) were collected in the Pueblo Viejo Lagoon which is part of the Tamiahua Lagoon system. Access to the area is by car to La Puntilla, Colonia Morelos, and by boat to Congregación Anagua. This village is located on the margin of the Lagoon. Access to the site is by boat. Oysters are lying on a fairly soft bottom.

Contamination:: Industrial and domestic effluents from the city of Tampico are discharged into this area through the Panuco River.

Laguna Madre (09/27/92). Oysters (*Crassostrea virginica*) were collected by tongs with the help of local fishermen from two soft bottom stations, about 300 meters apart, located in front of the local light house. Access to this area is by car from Matamoros to Puerto Mesquital and then by boat to the sampling site.

Contamination:: No sources of contamination were observed in the area.

Punta Banderas (10/01/92). Punta Banderas is located near Tijuana, Baja California, and about 7 km to the south of the border with the US (California). Duplicate samples (*Mytilus californianus*) were collected from rocks along the coastline.

Contamination:: Domestic and industrial effluents.

Ensenada (10/02/92). Samples (*Mytilus edulis*) were collected from the rocks that form the north side of the main marine port of Ensenada. The site is located within city limits.

Contamination:: Industrial and domestic effluents. Port activities.

San Felipe (10/02/92). San Felipe is located on the coast of the Gulf of California (Cortez Sea) about 270 km from Ensenada. Bivalves were difficult to find because of high tides. One duplicate sample of *C. columbiensis* ("Chinese oysters") was collected 20 km to the south of San Felipe, near Punta Estrella. Hard bottom.

Contamination:: No sources of contamination were observed in the area.

San Carlos (10/05/92). San Carlos is a small village located in Magdalena Bay area on the Pacific coast of Baja California. Because of it easier access, this sampling site replaced Isla Magdalena, situated in front of San Carlos. One station was sampled in the vicinity of the local thermoelectric plant.

Contamination:: Except for the thermoelectric plant, no obvious sources of contamination were observed.

Mazatlán (10/10/92). Samples ("Rock oysters") were collected from two sites fairly apart from each other. The first site is located about 5 km from downtown Mazatlán in Cerrito Beach. The second site is within the city limits and about 200 meters to the north of the Instituto de Ciencias del Mar y Limnología. In both cases, oysters, attached to rocks, were collected by local divers.

Contamination:: No sources of contamination were observed in the first site. The second sampling site is affected by domestic effluents and Mazatlán Port.

Altata-El Pabellón (10/10/92). The Altata-El Pabellón system is located about 220 km to the north of Mazatlán. In this site, duplicate samples (*Crassostrea rizhophorae*) were collected from 3 stations. Oysters were attached to the roots of the mangroves.

Contamination:: This is an area with extensive agriculture. Pesticides.

Punta Mangrove. Sampling in Punta Mangrove was planned before the sampling mission to Cuba, but it has to be canceled because of severe weather conditions. On October 9 and 10, hurricane Winifred hit the state of Michoacan between Lazaro Cárdenas and Punta Mangrove, severely damaging several routes and bridges.

CUBA

Cayo Culebra (10/14/92). Access to the sampling site is by car to Surgidero located about 50 km from La Habana on the south side of Cuba. From Surgidero, the access to the sampling site is by boat. The sampling site is located about 15 nautical miles from Surgidero on Cayos Las Cayamas, Batabano Gulf. Bivalves (*Isognomon alatus*) were attached to the roots of mangroves. *Contamination*:: Although the coastal area surrounding the Gulf is an area with intensive agriculture (sugar cane, banana), the sampling site seems isolated and free of contaminants.

Conclusions and Recommendations

Field sampling for the Initial Implementation Phase of International Mussel Watch required detailed pre-planning, good communication with Host Country scientists and extensive logistical support for the IMW Field Scientist. This equipment (all pre-cleaned) was transported via airline, bus, and auto as a part of the Field Scientists carry-on luggage. An "official" letter of introduction from the program was sometimes useful to the Field Scientist when passing through national customs.

Access to adaquate freezer space throughout a sampling mission is essential to the success of the program (frozen samples remain safely frozen for several hours in the travel chests used in Latin America). If freezer space (or electrical power) is anticipated to be erratic in any part of the global region being sampled, some other method of sample storage (e.g., grind with silica gel) may need to be used. Multiple sample storage methods should not be used in a single region. If the storage method adds weight or bulk to the sample, the length of a sampling mission will necessarily be shortened, adding to the expense and duration of the program.

Logistical assistance and local knowledge at each site was also a critical component to the success of the field sampling in this global region. Without the generous support of Host Country scientists who donated (in varying combinations) labspace, freezer space, ground transportation, boat transportation, technician assistance and specific local knowledge, this project could not have been accomplished. Host Country scientists who participated in this effort are listed in Appendix F. At some sites where there was no local contact, sampling in remote areas was personally hazardous and probably, in hindsite, should not have been attempted. In all cases, lack of a local contact made the sampling more time consuming and less efficient. Where no local contact is available, the Field Scientist should travel with a companion even though this will add to the cost of sampling. The Field Scientist should also be given guidelines as to when a sampling site should be scrubbed for logistic/safety reasons.

No matter how carefully sampling sites are pre-selected, a myriad of problems will be faced by the Field Scientist in the field. The Field Scientist must be experienced enough to be able to make intelligent choices in the field and be given enough freedom to make field decisions without further authorization from the Project Secretariat or other program component. Guidelines provided to the Field Scientist for this phase should be used in other global regions and should be expanded to include safety/logistics guidance as well.

Systematically recorded geographic location information would be a useful component of the global database and this information should be included in the sampling effort. The Field Scientist should be issued a hand-held GPS receiver to record the geographic location of each site.

This initial phase was a success because many people freely gave of their time and energy without hesitation. The contracts which financially supported this effort covered only the essential basic direct costs incurred and were a small fraction of the total effort made. If this attitude is carried over to the other global regions, the International Mussel Watch will continue to be successful .

Dr José Sericano
GERG
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College Station, TX

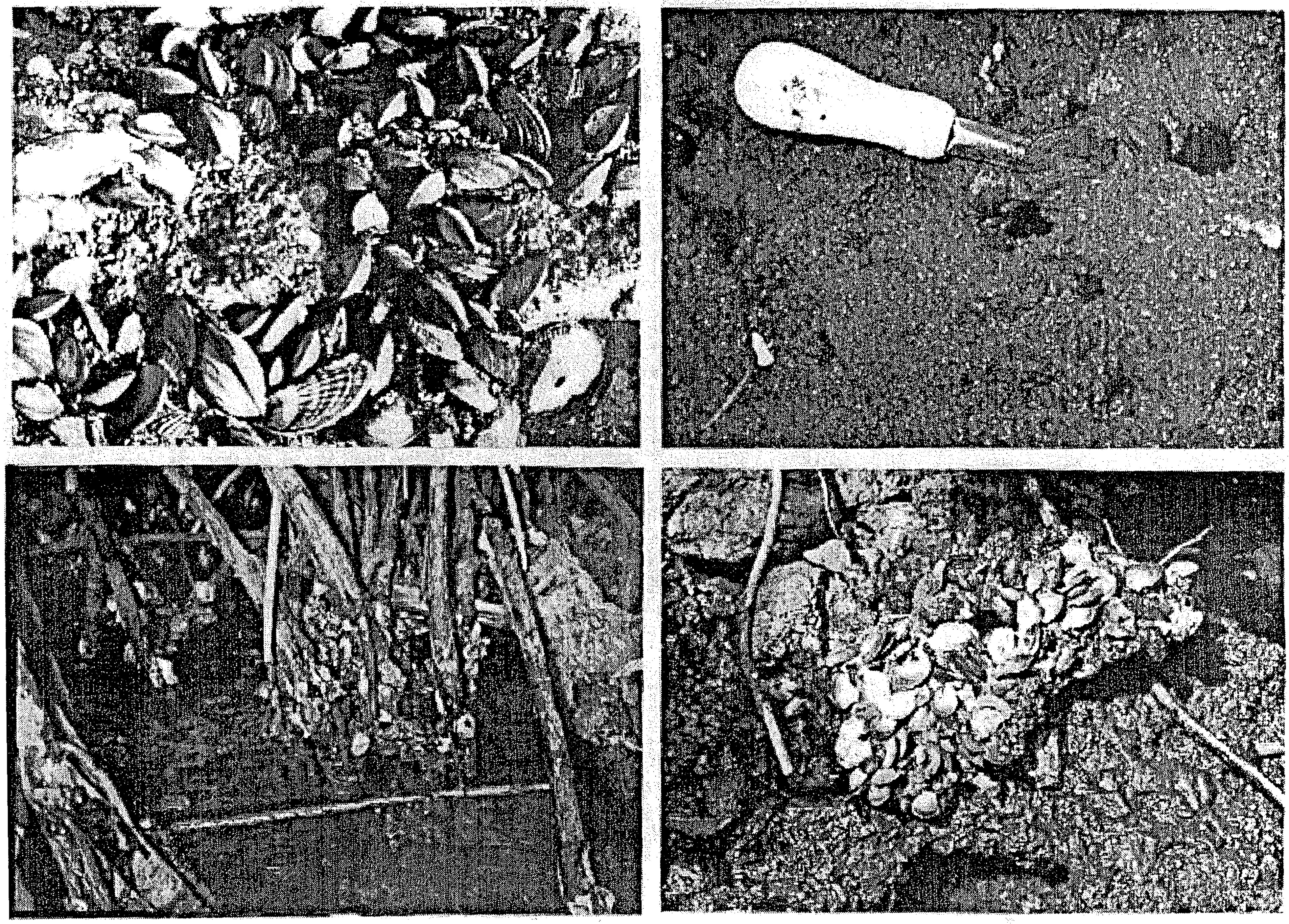

FIGURE 1

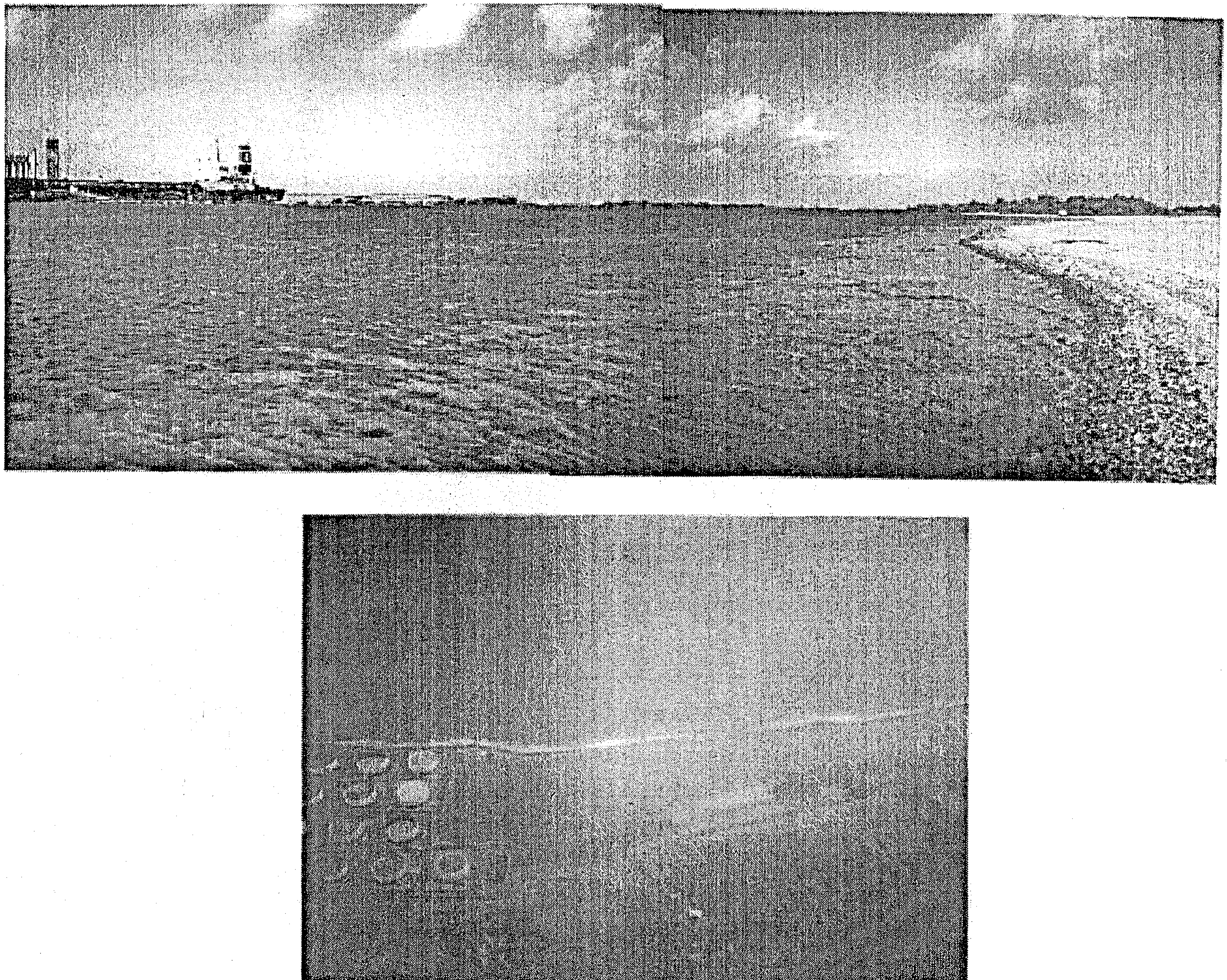

FIGURE 3

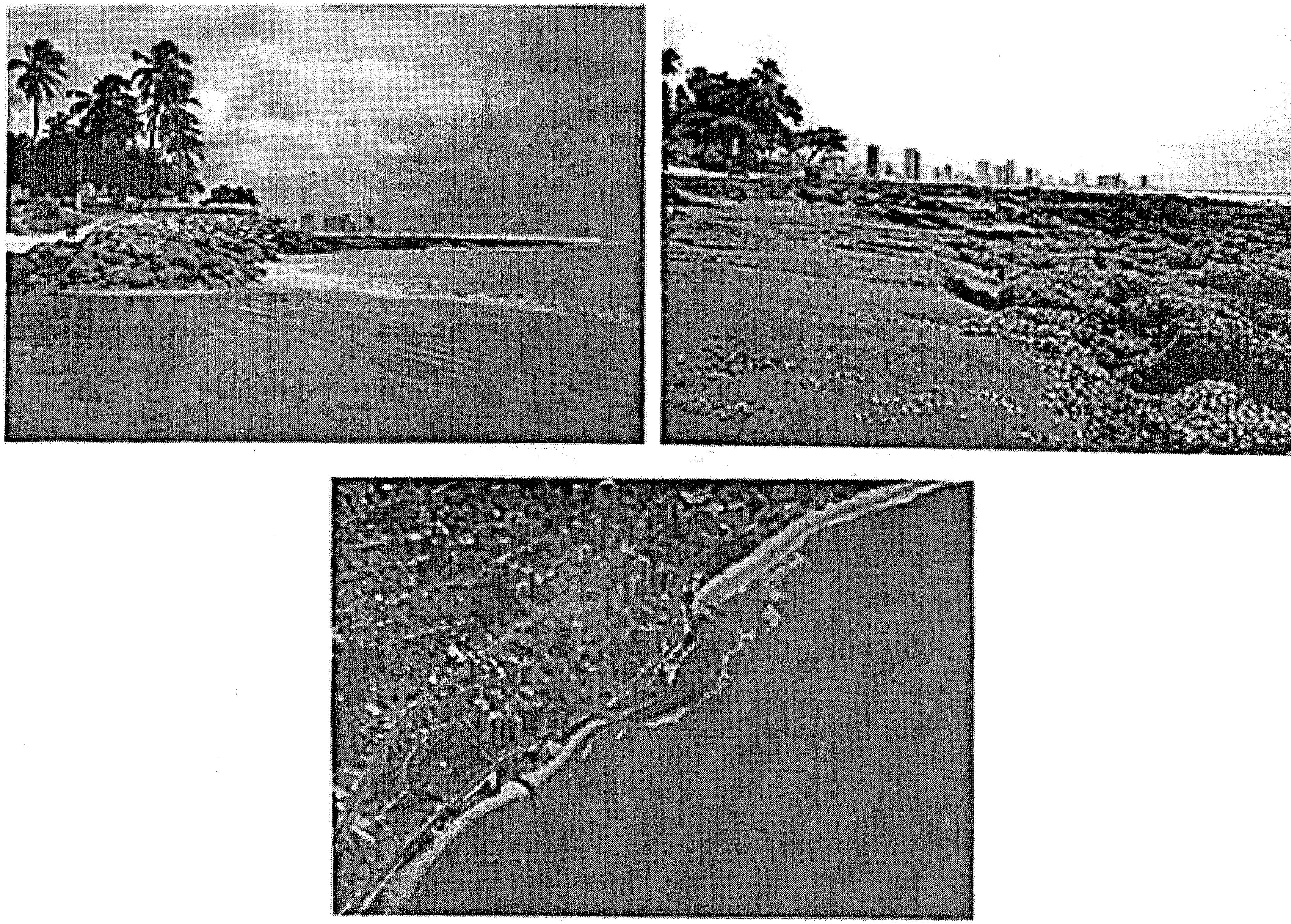

FIGURE 4

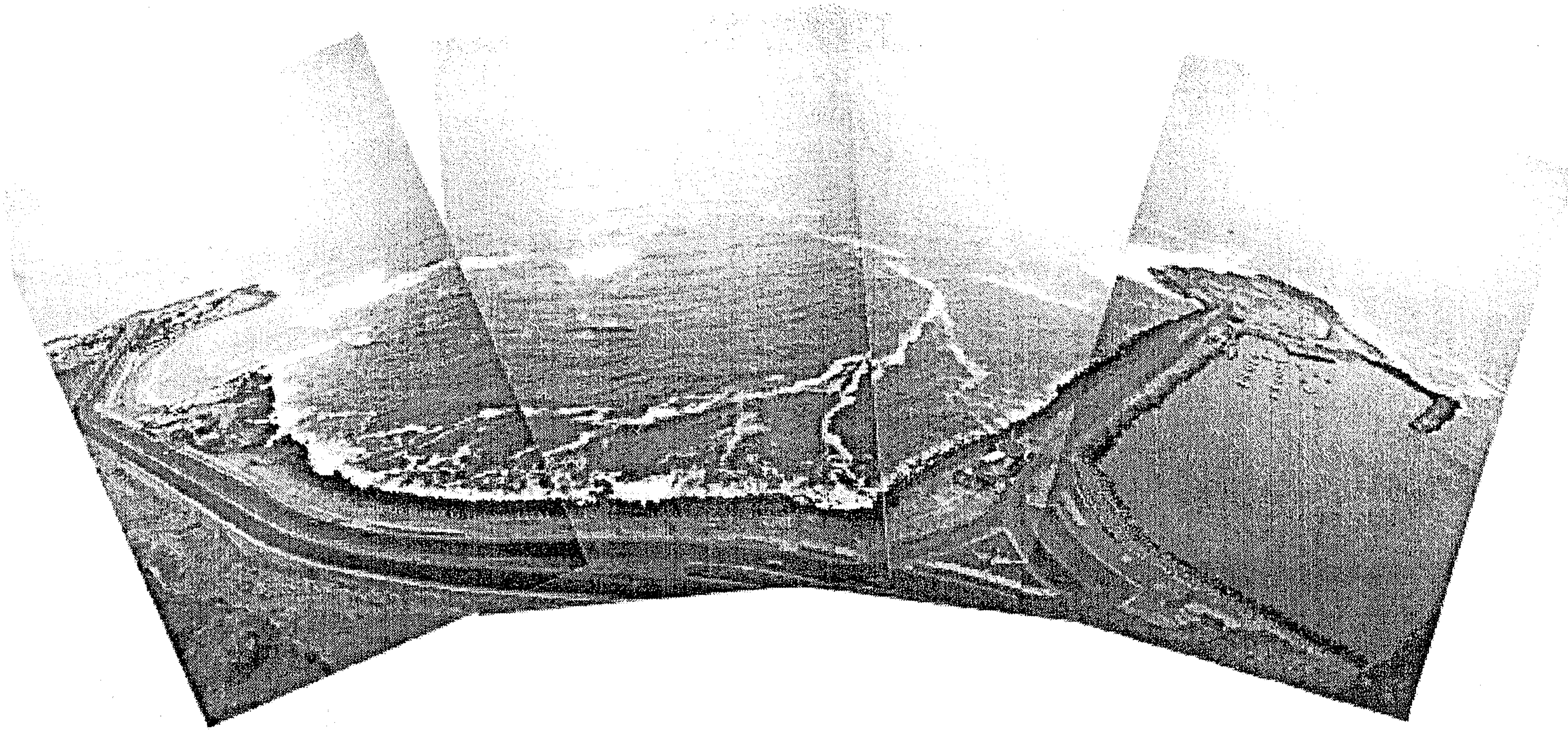

FIGURE 5

Appendix F

Host Country Scientists

Name	Affiliation
ARGENTINA	
Oscar Amin	Centro Austral de Investigaciones Cientificas
Dr. José Luis Esteves	Centro Nacional Patagónico
Dr. Rubén Hugo Freije	Instituto Argentino de Oceanografia
Lucio Jose Janiot	Servico de Hidrografia Naval (Oceanografia)
Jorge Eduardo Marcovecchio	INIDEP
BRAZIL	
Sr. Dalmo Lacerda Andre	Instituto de Estudios do Mar Almirante Paulo
Dr. Paulo da Cunha Lana	Centro de Bio. Marinha da Universidade
Dr. Silvo Jose de Macedo	UFPE - Campus Universitario
Dr. Luis Felipe Niencheski	Fundação Universidad do Rio Grand
Dra. Tania M. Tavares	Universidade Federal da Bahia
Dr. Rolf Roland Weber	Universitária - Butantã
CHILE	
Dr. Lizandro Chuecas	Universidad de Concepción
Victor A. Gallardo	Universidade de Concepción
COLOMBIA	
Fidel Robinson Casanova	Centro de Control de Contaminación
Mario Palacios	Centro Control Contaminacion del Pacifico
Dr. Jesus T. Antonio Garay Tinoco	Centro de Investigaciones Oceanograficas
COSTA RICA	
Jenaro Acuña Gonzalez	Universidad de Costa Rica
Olga Marta Rodriguez Brenes	Universidad de Costa Rica
Alexis Rodriguez	Universidad de Costa Rica
CUBA	
Gonzalo Dierksmeier Corcuera	Instituto de Investigaciones de Sanidad Vegetal
Fernado Ruiz Escobar	Instituto Investigaciones del Transporte, CIMAB
Jesus Boltran Gonzalez	Instituto Investigaciones del Transporte, CIMAB
ECUADOR	
Dra. Lucia Solorzano	Instituto Nacional de Pesca (INP)

Name	Affiliation
HONDURAS, C.A.	
Dr. Luis Munguía Guerrero	Centro de Estudios y Control de Contaminantes, CESCCO
JAMAICA	
Dr. Ajai Mansingh	University of the West Indies
MEXICO	
Dr. Alfonso Vazquez Botello	Instituto de Ciencias del Mar y Limnologia
Gerardo Gold Bouchot	CINVESTAV - IPN, Unidad Merida
Dr. Fernando Gonzalez-Farias	Instituto de Ciencias del Mar y Limnologia
Dr. Efraín A. Gutiérrez-Galindo	Universidad Autonoma de Baja California
Omar Zapata Perez	CINVESTAV - IPN, Unidad Merida
NICARAGUA	
Dr. Salvador Montenegro	Universidad Nacional Autonoma de Nicaragua
Marta Lacayo R.	Universidad Nacional Autónoma de Managua
Mauricio Lacayo	Universidad Nacional Autónoma de Managua
PANAMA	
Vasco Duke	Universidad de Panama
PERU	
Dra. Ruth Calienes	Instituto del Mar del Perú
Quim. Maria Elena Jacinto	Instituto del Mar del Perú
PUERTO RICO	
Jorge Corredor	Universidad de Puerto Rico
TRINIDAD, WEST INDIES	
Dr. Avril Siung-Chang	Institute of Marine Affairs
Dr. Winston F. Tinto	Institute of Marine Affairs
URUGUAY	
Ing. Jorge V. Altamirano	INAPE
Sr. Juan Miguel Moyano Recine	Hidrografia y Meteorologia de la Armada
VENEZUELA	
Dr. Rudolf Jaffe	Universidad Simon Bolivar